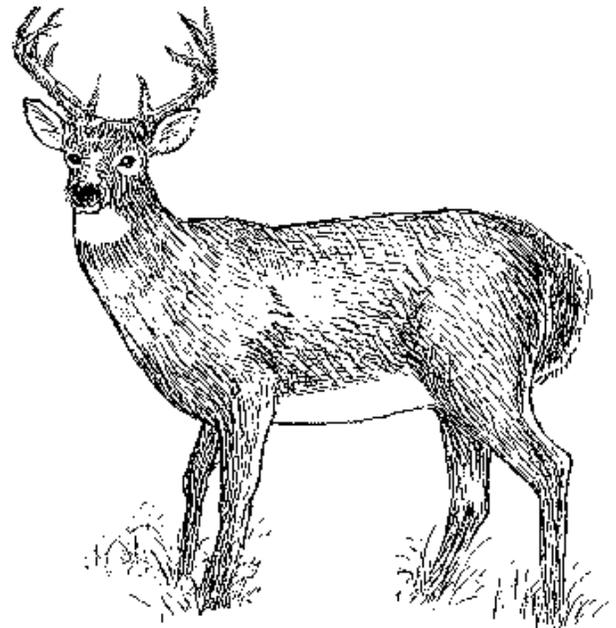


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# **Community-Based Deer Management: Learning and Community Capacity**



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## HUMAN DIMENSIONS RESEARCH UNIT PUBLICATIONS SERIES

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This publication is part of a series of reports resulting from investigations dealing with public issues in the management of wildlife, fish, and other natural resources. The Human Dimensions Research Unit (HDRU) in the Department of Natural Resources at Cornell University studies the social and economic values of wildlife, fish, and other natural resources and the application of such information in management planning and policy. A list of HDRU publications may be obtained by writing to the Human Dimensions Research Unit, Department of Natural Resources, Fernow Hall, Cornell University, Ithaca, NY 14853, or by accessing our World Wide Web site at: <http://www.dnr.cornell.edu/hdru>.



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## **ACKNOWLEDGEMENTS**

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I am grateful to the individuals who agreed to be interviewed as part of this study.

Cover drawing by Robert Savannah, U. S. Fish and Wildlife Service.

## EXECUTIVE SUMMARY

Urban and suburban deer management issues are some of the most common controversies that wildlife managers must face. These issues can be exceedingly difficult to address. Communities may take years to conclude they have a problem with deer, struggle to evaluate the appropriateness of different deer management methods, and become deadlocked in discussions over whether or not to use lethal control. State wildlife agencies often find it difficult to know how to assist communities in these situations.

Some communities are more successful than others at navigating this tricky terrain, however, and a number of studies have helped to identify those community characteristics that build capacity for and promote learning about deer management. State wildlife agencies that recognize these characteristics are in a better position to help communities address their deer-related problems. This study was designed to refine understanding of community characteristics which provide capacity with a particular focus on the importance of relationships and partnerships.

We tracked the progress of selected communities managing deer over several years. In this study we:

- Selected communities early in the process of managing deer (i.e., no significant management actions initiated to date).
- Identified the key stakeholders involved in deer management in each community.
- Assessed the key characteristics of each stakeholder: resources they controlled, authority they wielded, attitudes they held, roles they played, etc.
- Characterized the relationships between stakeholders – who interacted with whom and for what purposes?
- Assessed the importance of other factors contributing to community capacity to manage deer.
- Followed how the deer management issue in each community evolved, if at all.

We initiated this study in 2006. Based on recommendations from New York State Department of Environmental Conservation (NYSDEC) staff members, we selected three New York State communities as study sites: Greenburgh, Rye, and Manlius. The criteria for selecting the communities were that: (1) local deer management had surfaced as a public issue; (2) no significant deer management actions had taken place to date; and (3) further management discussions and actions seemed likely. We collected data in each community from written documents and interviews and surveys of key stakeholders.

Based both on theory and our analysis of cases, we have identified several possible barriers to deer management. The three most important barriers were inadequate stakeholder engagement, a decision-making process that was ineffective at promoting information exchange and dialogue, and lack of leadership.

## **Inadequate Stakeholder Engagement**

One of the most important barriers to deer management is inadequate stakeholder engagement. Stakeholders with *power*, *legitimacy*, and *urgency* must be involved in some way. Power refers to the ability to make certain outcomes occur. In natural resource management, stakeholders with power may have the ability to provide financial or other resources. Legitimacy, which is often but not always associated with power, is a characteristic of stakeholders who are acknowledged to have an appropriate role in a given context. In natural resource management, stakeholders who provide legitimacy include those who have the legal authority to approve or prevent a particular course of action and those who can determine whether or not a project gets the resources it needs. Urgency refers to the importance of outcomes to stakeholders. In natural resource management, stakeholders with urgency are those to whom management outcomes are important. Key questions to guide the process of stakeholder engagement include:

Power: Are those most likely to fund local deer management (elected officials and large public landowners) involved in the process to some degree? Are individuals with sufficient knowledge about public policy decision-making processes involved? Are state wildlife biologists, university personnel, or others with expertise about deer biology helping to inform discussions?

Legitimacy: Are local elected officials, with the legitimacy to modify local laws and regulations (to either expand or restrict deer management options), engaged in discussions? Are large public and private landowners with control over lands with deer engaged?

Urgency: What are the key concerns about deer management (both those supportive of deer control and those concerned about it) in the community? Are individuals with those concerns engaged in discussions?

## **Ineffective Process**

Not only can deer management discussions be undermined if all key stakeholders are not involved, but they also can be undermined if the process of involving them is not effective. While no cookbook recipe exists for identifying stakeholders and designing a decision-making process, several considerations can inform process design.

The process should be effective at promoting a free flow of information between all key stakeholders (rather than having discussions limited to particular subgroups). Although information should freely flow between stakeholders, not every stakeholder has to be engaged in every part of the discussions. Stakeholders with urgency (strong concerns related to deer management) likely need to be most actively engaged in discussions developing policy alternatives. These discussions should be informed by an understanding of effective policy making processes and of deer management and biology, but those individuals contributing this understanding do not necessarily have to be involved in making the actual decisions. Individuals and organizations in a position to fund and legitimize management need to be aware of, informed about, and support discussions, but do not necessarily need to be active participants.

## **Lack of Leadership**

Closely related to the design of the decision-making process is the effectiveness of local leadership. Effective leaders tend to be: (1) viewed as legitimate by other stakeholders; (2) committed to addressing deer-related problems; (3) aware of the actions and resources needed to address these problems; and (4) willing to invest in relationship-building and dialogue. Leaders and potential leaders who are missing some of these characteristics may be less effective.

Continued monitoring of deer management efforts in Rye, Manlius, and Greenburgh may be fruitful. Given the data collected to date, a foundation exists for understanding any further issue evolution in these communities. In addition, it may be worthwhile to develop future studies to explore the needs and perspectives of those local stakeholders with the greatest legitimacy in deer (and other wildlife) management issues – local elected officials and managers of large land parcels. Little research attention has been directed towards these groups in the past, but the degree of influence and control they have over wildlife management makes them well worth understanding.

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## INTRODUCTION

Urban and suburban deer management issues are some of the most common controversies that wildlife managers must face. These issues can be exceedingly difficult to address. Communities may take years to conclude they have a problem with deer, struggle to evaluate the appropriateness of different deer management methods, and become deadlocked in discussions over whether or not to use lethal control. State wildlife agencies often find it difficult to know how to assist communities in these situations.

Some communities are more successful than others at navigating this tricky terrain, however, and a number of studies have helped to identify those community characteristics that build capacity for and promote learning about deer management. State wildlife agencies that recognize these characteristics are in a better position to help communities address their deer-related problems. This study was designed to refine understanding of community characteristics which provide capacity with a particular focus on the importance of relationships and partnerships.

Communities that decide to address deer-related problems tend to progress through a series of stages. Raik et al. (2005b) characterized these stages using a model of public policy issue evolution advocated by Hahn (1990). They concluded that as local deer management issues develop: (1) individual residents begin to get concerned about the impacts of deer; (2) these residents start to communicate their concerns to decision makers; (3) a critical mass of stakeholders in the community reach consensus that deer are causing unacceptable impacts; (4) possible alternatives for reducing these impacts are discussed; (5) the consequences of these alternatives are considered; (6) a particular management alternative is chosen; (7) the management alternative is implemented; and (8) the management alternative is evaluated. Although these stages typify the evolution of many issues, issue evolution in particular communities often occurs in a disjointed, non-linear way, with some stages revisited several times before other stages are reached.

For communities to progress through these stages, learning must occur. Perhaps the most obvious learning that occurs is learning about the effects of possible management actions. This type of learning, however, is only one of four distinct types that have been identified in community-based deer management issues (Lauber and Brown 2006):

- *Technical learning* involves efforts to find new policies to accomplish objectives, but does not include reconsideration of the objectives.
- *Conceptual learning* consists of the search for new objectives and new ways of defining the problem that is being addressed.
- *Social learning* focuses on relationships between stakeholders and the quality of dialogue between them. It involves learning about how to promote effective communication and interaction between stakeholders.
- *Political learning* involves learning how to advance the recognition of particular public problems or how to garner support for one's ideas.

These types of learning are interdependent (Raik et al. 2005a, Lauber and Brown 2006). Technical learning (finding ways to accomplish management objectives) depends on conceptual

learning (deciding what those objectives should be). Social learning (cultivating relationships and dialogue) serves as a foundation for all the other learning types.

The ability of communities to learn to address local deer issues depends on their capacity. A variety of characteristics have been found to contribute to capacity for collaborative wildlife management (Raik et al. 2005a, Lauber et al. 2009). These include factors such as:

- Relationships between key stakeholders in a community.
- The quality and quantity of dialogue taking place between these stakeholders.
- Agreement within a community about what needs to be accomplished.
- The legitimization of management by those in positions of authority or influence.
- Coordination of the activities of different stakeholders.
- Information about key topics relevant to deer issues.
- Funding and labor to support decision making and action.

The factors that are most important vary in different stages of deer management (Raik et al. 2005b). One factor that has been found to be important throughout the entire management process, however, is local leadership – provided by an individual who plays a key role in initiating or sustaining action on deer management (Raik et al. 2005a). Lauber et al. (2009) identified some of the characteristics of leaders in local wildlife management efforts. They argued that leaders: (1) were viewed as having a legitimate role in the issue by other stakeholders; (2) were committed to seeing the issue addressed; (3) recognized what actions or resources would contribute towards progress on the issue; and (4) paid particular attention to building relationships and promoting dialogue among key stakeholders.

While this research has advanced understanding of urban and suburban deer management considerably, refinement of this understanding is still needed. For example, while we know that relationships and partnerships have an important influence on attempts to address community deer management issues, we do not know answers to questions such as: how many and which people or organizations need to be involved in these relationships or partnerships; how do they need to interact with each other; and how do these requirements vary in different contexts?

This study was designed to begin to address some of these information gaps, particularly in reference to the importance of relationships and partnerships. Because much past research on community-based deer management has been conducted retrospectively, it has relied on written records and the memories of participants in deer management discussions. We designed this study to follow community-based deer management issues as they evolved, believing that this would allow us to develop a more detailed understanding of the necessary characteristics of relationships and partnerships and other elements that contribute to community capacity. A better understanding of these characteristics will help agencies know how to assist communities that are struggling with deer-related problems.

We tracked the progress of selected communities managing deer over several years. In this study we:

- Selected communities early in the process of managing deer (i.e., no significant management actions initiated to date).
- Identified the key stakeholders involved in deer management in each community.
- Assessed the key characteristics of each stakeholder: resources they controlled, authority they wielded, attitudes they held, roles they played, etc.
- Characterized the relationships between stakeholders – who interacted with whom and for what purposes?
- Assessed the importance of other factors contributing to community capacity to manage deer.
- Followed how the deer management issue in each community evolved, if at all.

To assess stakeholder characteristics, we followed the framework developed by Mitchell et al. (1997). They identified power, legitimacy, and urgency as the three key characteristics of stakeholders. Power refers to the ability to make certain outcomes occur. In natural resource management, stakeholders with power may have the ability to provide financial or other resources. Legitimacy, which is often but not always associated with power, is a characteristic of stakeholders who are acknowledged to have an appropriate role in a given context. In natural resource management, stakeholders who provide legitimacy include those who have the legal authority to approve or prevent a particular course of action and those who can determine whether or not a project gets certain resources. Urgency refers to the importance of outcomes to stakeholders. In natural resource management, stakeholders with urgency would be those to whom management outcomes are important.

## **METHODS<sup>1</sup>**

We initiated this study in 2006. Based on recommendations from New York State Department of Environmental Conservation (NYSDEC) staff members, we selected three New York State communities as study sites: Greenburgh, Rye, and Manlius. The criteria for selecting the communities were that: (1) local deer management had surfaced as a public issue; (2) no significant deer management actions had taken place to date; and (3) further management discussions and actions seemed likely.

Contacts with NYSDEC and local government officials at each site helped us identify key stakeholders who had been engaged in discussions about deer management in each community and other sources of information relevant to local deer management history. Written documents, including government reports and memos, meeting minutes, and newspaper and magazine stories, were used to develop an initial understanding of how deer management had evolved at each site and to supplement and verify the data collected through interviews.

After identifying those individuals who had played the most significant role in local deer management discussions we conducted: (1) indepth semi-structured interviews of these individuals focusing on their own perspectives on and involvement in local deer management;

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<sup>1</sup> These research methods were approved by the Institutional Review Board at Cornell University, protocol # 0904000301.

and (2) a standardized survey of these individuals assessing their interactions with other deer management stakeholders.

## **Interviews**

Between four and ten key stakeholders from each site were interviewed by telephone. Interviewees included state and local government representatives and community members. Interviews consisted of a series of open-ended questions. Key interview topics included:

- how respondents had been involved in local deer management and their reasons for involvement;
- the interactions respondents had had with other stakeholders;
- key events related to deer management that had taken place; and
- progress made on local deer management.

The particular order in which these topics were covered varied for respondents according to the role they played in deer management and their preferred communication style. Interviews were audio recorded and transcribed. Transcripts were coded – broken into meaningful segments (sentence or paragraphs) and assigned to descriptive categories. Coding allowed patterns in the data to be explored using qualitative data analysis software. During the coding process, we were particularly attentive to: (a) distinguishing characteristics of stakeholders that were involved in deer management locally; (b) the relationships and interactions between stakeholders; and how these affected policy learning and progress on deer management.

## **Social Network Analyses**

Various ways exist to construe relationships (e.g, frequency of interactions, level of friendship, shared characteristics, etc.). Because developing a shared understanding of an issue is important in its resolution, for this study we considered the degree to which stakeholders relied on the same sources of information about deer management as a measure of the closeness of their relationship in this context. These sources of information consisted of both individuals (including other individuals involved in local deer management) and organizations. The relationships between individuals link a set of individuals together in a social network.

To assess these relationships, we conducted a survey of all community members who had been identified as playing a significant role in local deer management discussions in each community. These were local individuals who either participated in community deliberation about deer management or would have to do so before any deer management actions could be implemented (local elected officials and land managers). Because NYSDEC did not attempt to persuade communities to take particular courses of action, its staff members were not surveyed as part of this analysis (although those staff members often served as important sources of information for individuals who were surveyed).

We collected data on the individuals and organizations on which respondents relied for information related to deer management. We used Ucinet 6 for Windows to apply social network analysis methods to analyzing these data. Social network analysis includes a variety of

methods that allow analysis of relationships. Characteristics of the networks that may influence individuals within it include how many sources of information each individual receives information from and which sources they receive information from. Sharing a single information source creates a weak linkage between individuals; sharing many information sources creates a strong linkage. We used Netdraw for Windows to depict the patterns of relationships between stakeholders.

## **Monitoring**

We allowed several years to elapse to determine whether and how the deer management issues evolved in each community. During this period, we collected additional data about each community through follow-up interviews with key stakeholders, newspaper articles, and written reports. We analyzed how stakeholder characteristics and relationships related to deer management evolution in each community and drew comparisons across cases.

## **RESULTS**

We analyzed each case according to: (1) the characteristics of stakeholders who were engaged in deer management discussions; and (2) the factors influencing the communities' capacity for deer management. The case descriptions are followed by a cross-case analysis.

### **Rye Case Description**

Rye is a city of 15,000 people on Long Island Sound in Westchester County, New York. The six square mile community is primarily residential with one-fifth of its land devoted to recreation and conservation. Deer surfaced locally as an issue in 2004. Most of the deer are concentrated in and around two county-owned wildlife sanctuaries at opposite ends of the city.

### **Key Stakeholders**

City of Rye. When concerns about deer emerged in 2004, the city of Rye received most of the complaints and had the legitimacy to initiate local decision making about how to address these concerns. The City Manager, who was primarily responsible for day-to-day decision making in the city, asked the City Naturalist to lead the deer management decision making effort. The City Council serves as the chief policy making body with the power to approve or block any deer management decisions.

Rye Deer Committee. The Rye Deer Committee was appointed by the City Manager late in 2004 to study and recommend solutions to deer-related problems. The committee was facilitated by the City Naturalist.

Westchester County Department of Parks, Recreation and Conservation. The county parks department manages nearly 50 parks and recreation areas in the county encompassing 18,000 acres. The largest concentrations of deer in the city were found in two wildlife sanctuaries operated by the parks department. Hunting was not permitted within these sanctuaries. Concern

about deer and their negative impacts on the environment has been strong within the parks department.

Westchester County Forest Regeneration Task Force. Because of ongoing concerns about the impacts of deer on the ecosystem in Westchester County, a task force was appointed by the county executive to study the problem and recommend actions in 2006. This task force included both agency representatives and interested individuals. They released a report in October 2008 recommending expanded hunting and culling throughout Westchester County.

Local Residents. Some residents were concerned about the impacts of deer in Rye, and it was lobbying from these residents that led to the creation of the Rye Deer Committee. Most concerns about deer came from residents living near the wildlife sanctuaries in which large populations of deer resided. Other residents were concerned about deer welfare and opposed to hunting.

New York State Department of Environmental Conservation. The state wildlife management agency has served primarily as a technical and process advisor. Rather than advocating for a particular solution, NYSDEC has tried to provide factual information about deer and deer management and make suggestions about how to proceed with locally led decision making. NYSDEC initially proposed the creation of the Rye Deer Committee.

### **Sequence of Events**

Residents' complaints about deer began to increase in 2004. Most of these complaints were directed to the city manager and city naturalist. The city contacted NYSDEC, which suggested the formation of a deer committee of local residents to study and recommend actions to address the concerns.

The Rye Deer Committee was formed late in 2004. The city manager, in consultation with the city naturalist, selected 10 individuals to serve on the committee from among those who applied. An effort was made to assure committee membership was balanced with respect to location of residence within the city and opinions about deer. The committee included five individuals who favored deer control and five who opposed it.

The committee met monthly and was facilitated by the city naturalist who attempted to play a neutral role.

*I facilitated it. We didn't have a chair or anything like that ...I went in with what I consider a pretty professional and open mind and I was being very neutral. We decided not to have a chair because we felt that it might influence the direction... Basically it was just me taking in their requests and going with it and going in every direction they wanted to go.*

The committee spent a period of time learning about deer and deer management. Outside speakers with various sources of expertise (a NYSDEC biologist, a hunter, and a representative of the Humane Society) made presentations to the committee. The committee gathered information about the community through a survey of residents and attempted to measure the

size of the deer population. They studied possible strategies for addressing deer-related problems, but ultimately concluded that deer control was not necessary because: (1) deer problems were not severe and widespread; (2) residents were not strongly in favor of deer control; and (3) the county-owned wildlife sanctuaries, which were the primary loci of the deer populations, did not allow hunting. The recommendations they made to the city council reflected these conclusions:

*We made some recommendations to have the council perhaps talk to the county to see if they could do something to address the situation. We also recommended that there be more education for people. We set up a system for the police so that the city naturalist would still be informed about accidents that involved deer so that we can basically start getting a base of information all in one place. Definitely the survey did not scream out "There's a major deer problem so we need to go and start killing them!" It did not say that at all. We didn't make any recommendations for any hunting or anything ... We recommended that the city explore ways to help the residents deal with the situation on their own property by education and information.*

### **Factors Influencing Capacity**

Relationships and Dialogue. Several strategies for fostering relationships and dialogue contributed to the decision making about deer in Rye. The first of these was the formation of the deer committee, which provided an opportunity for communication among residents with diverse perspectives. The effort of the city naturalist, who facilitated the committee, to remain neutral helped to ensure that the committee would be comfortable with whatever decision they eventually reached.

*I kept telling myself to remain neutral. I needed to stay out of it and it had to be coming from the committee. That really is what's going to make it work because if they feel like they're being guided it will not work ...especially with the anti-hunter. If she felt like it was being guided in any way then she felt there was already an agenda.*

The committee also broadened the dialogue by reaching out to other residents through a mail-back survey that was distributed to all residents through a recreation brochure. This survey, which generated 300 responses, assessed the impacts of deer and attitudes toward deer and deer management:

*In the survey it asked questions about Lyme disease. "Do you feel deer are/are not a problem?" "Would you allow a hunter on your property or not?" We wanted to get what the ethical feel was for the community as well as some of the hardcore facts. We asked about car accidents, cost of damage, injuries...In one part of it we asked, "In an average week, how many deer do you see?" We asked people to include their address because we wanted to know where people are seeing deer.*

Discussions in Rye have been linked with broader discussions about deer within Westchester County. The city naturalist served on the Westchester County Forest Regeneration Task Force

after it was created. This connection has allowed city residents to feel more comfortable that their concerns about deer are being addressed.

*Now I'm on the new committee that Westchester has ... That really makes the residents feel good that I'm on the county committee. I tell them about the [city] committee and they're not satisfied with that. Now that I'm telling them that I'm on the county committee it is really satisfying people's need for feeling like something is being done, which I thought was interesting. The community committee they didn't feel comfortable with, but being on the county committee speaks to them.*

Agreement. Despite the diversity of opinions represented on the committee, it was able to reach agreement on a course of action. This course of action prioritized education:

*Basically what everybody decided was that we needed to inform people of their options. You kind of don't want to say it...but to promote hunting...to tell people about hunting, what they can do on their property...And we decided to come out with a brochure that's specific to Rye that says, "Here's where you can get this stuff...at this store, etc." "Here's who you can call in our area." "These are our local hunting places." We also are working with the police in possibly setting up a registration system so if you are having hunting on your property, the hunters should register with the police so that the police will know when, where, that sort of thing...and a possible neighbor notification policy so that the neighbors are aware that there's going to be hunting. That's basically where we left it.*

The willingness of some committee members to accept positions which they would not have accepted initially was striking to some:

*We had some extremes on our committee. We had somebody who is definitely environmentalist...never kill Bambi...to somebody who felt that ... deer don't belong here... What was really neat after the deer count when we all sat down and assessed everything, the person who was basically anti-hunting said, "Wow...I guess if people do need to hunt on their property because they're getting so much damage, I guess that's okay."*

This agreement was aided by a couple of factors. On the one hand, a public hunt, which would have been very controversial, was not a realistic option.

*I think that the city, behind the scenes, knew all along that there was no way we were going to do a hunt because first of all, the way Rye is, where are we going to do it? The two county parcels do not allow hunting and the Nature Center doesn't allow hunting. But it is city-owned so maybe they could change the policy, but there aren't enough deer there.*

On the other hand, the survey of the community made it clear that there was "no great groundswell of support to do something."

Nevertheless, not all members of the committee were satisfied with the discussions or their results. One member described meetings as “acrimonious” with some members “more concerned with wildlife than human health.” She believed that the necessary action was difficult to achieve because the state was afraid of “Bambi mommies.”

Legitimacy. Several strategies for approaching deer management decision making in Rye helped foster the legitimacy of those efforts. The first of these was the facilitation of the committee discussions by an individual who attempted to remain neutral, as discussed above. Second, the decision was made to ensure diverse opinions on the committee without allowing pro-deer control or anti-deer control individuals to dominate.

*We connected with DEC and [they] actually suggested that maybe we have a committee and so we did start a committee ...It was about two years ago. It was basically set up by five people who in favor of not killing deer and five people who are kind of upset with deer...*

At another level, the city council appointed one of its members to serve as a liaison to the committee. This step ensured that those with the authority to make local deer management decisions were in a position to monitor the discussions leading up to those decisions.

Information. A variety of efforts by the deer management committee to gather information that could contribute to its decision making were made. Two of these efforts were particularly important. First, the committee made a decision to conduct a survey of residents’ opinions about deer and deer management, as discussed above. While not a scientific survey, it provided them with enough information to conclude that there was “no great groundswell of support” in the community to reduce deer.

Also, there was also an attempt to count the number of deer in the city. Some members of the committee believed a deer count was unnecessary for making sound management decisions:

*There isn’t a given number of how many deer there should be per acre. It’s a matter of how much damage you have...then you need to take some away and assess the damage after that.*

But even some of these members believed a deer count was useful because it provided input to the committee’s overall situation analysis and won the support of other members of the committee:

*Some committee members weren’t satisfied with that alone and they really wanted to do a deer count. And that was kind of a problem because to get a hardcore real number you’re either going to have to do a fly-over or a really good scientific study. They wouldn’t give up on it. There are actually two of them. I said, “We’ll do a very informal deer count.” What we did was we took the three natural areas that I mentioned...the two county places and the Nature Center...and we had volunteers that went in a grid method and counted the deer so we got some numbers. They were happy that we finally did a deer count.*

Leadership. The individual in the most recognizable leadership role in Rye was the city naturalist who also chaired the deer committee. She was viewed as a legitimate leader both because of her subject matter expertise and because the city manager appointed her to chair the committee. As reflected by the data above, she was not committed to one particular approach to managing deer but instead was committed to a particular type of process for making deer management decisions. She worked to facilitate an open and balanced dialogue on the deer committee without directing the conversation in a particular direction. Her efforts contributed to the committee's ability to reach a decision about the issue.

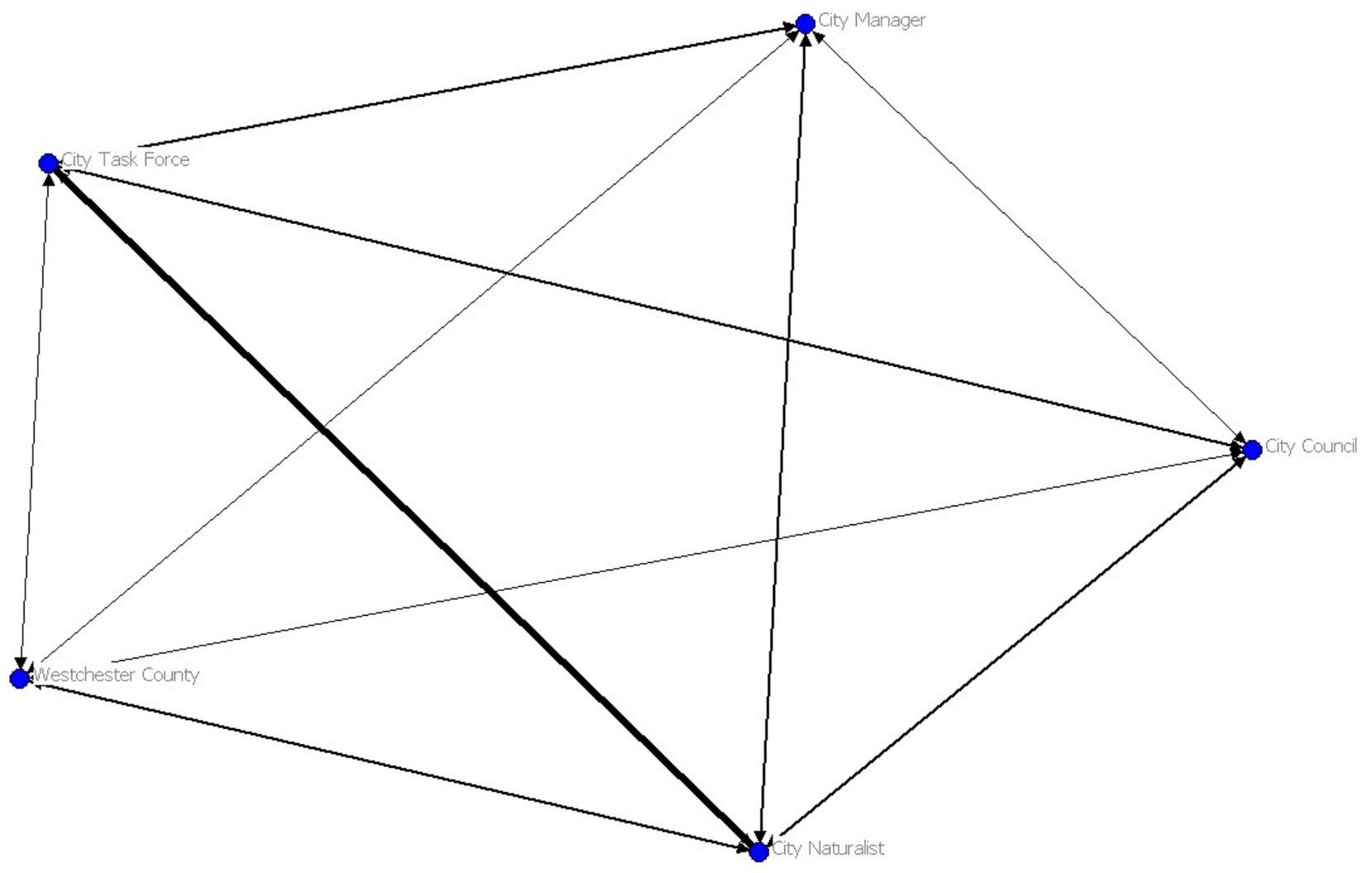
### **Social Network Analysis**

The actors in our social network analysis were official government bodies or positions (rather than individuals). Figure 1 reflects the strengths of the linkages between each pair of local actors based on the number of common information sources they shared. The diagram reflects a fairly cohesive set of actors. Each operates in a similar information environment. A particularly strong linkage exists between the city naturalist, who would have a key role in implementing any deer management policies, and the city deer task force, which she chaired.

### **Overall Assessment**

While not every member of the deer committee or every Rye resident was satisfied with the outcome of the committee discussions, it seemed to largely reflect the will of the community. Although deer problems existed (and continue to exist) they were perceived as being localized enough that a citywide deer control program did not seem warranted. The careful attempts to ensure a balance of perspectives on the committee helped to build support for it. Hunting remains the only legal method of controlling deer in Rye, although it can not currently be used in the two wildlife sanctuaries which are the loci of the deer populations in the town. However, since the county parks department has become actively engaged in promoting deer hunting, it may be that this situation will change.

**Figure 1.** Social network map of deer management stakeholders in Rye. Lines indicate stakeholders shared common sources of information, and the thickness of lines indicates the number of common sources of information.



## **Manlius Case Description**

Manlius is a town southeast of the city of Syracuse in upstate New York. Fayetteville is a village contiguous with the town. The combined population of the town and village is approximately 35,000. Local residents began to complain about the impacts of a large local deer herd beginning in 2004. Green Lakes State Park, an approximately 2,100-acre park in the town and village, is perceived to be a locus of the deer population.

### **Key Stakeholders**

Town of Manlius and Village of Fayetteville. Two successive town supervisors, the village mayor, and town council members have been interested in trying to resolve residents' concerns about deer-related impacts. As elected officials, these individuals have the legitimacy to play a lead role in local decision making.

Green Lakes State Park. As the largest land parcel in the community and the perceived locus of the deer population, Green Lakes State Park would probably have to be involved in any deer management efforts in order for them to be successful. Hunting is not currently permitted in the park. Although park officials have been willing to discuss incorporating deer management objectives into park management (including allowing deer hunting), they also must be responsive to the interests of other park users, many of whom view hunting as incompatible with other activities taking place in the park.

Local State Assemblyman. One local state assemblyman was approached by residents concerned about deer in 2004. He had the legitimacy to initiate meetings including residents, town and village officials, and deer management experts to discuss residents' concerns and possible responses to them. This individual is no longer in the state assembly.

Local Residents. Some local residents have been primarily concerned about negative deer-related impacts. Their engagement in dialogue surrounding this issue has been inconsistent. One resident helped to initiate meetings with public officials about deer in 2004, but did not want to be a lead advocate for efforts to reduce deer-related impacts. Residents showed up for the meetings he initiated, but have not stayed engaged in deer management discussions consistently. Another group of local residents has been concerned primarily about preventing deer hunting from taking place within Green Lakes State Park. These residents have been most active when allowing hunting in the park has been under discussion.

New York State Department of Environmental Conservation. The state wildlife management agency has served primarily as a technical and process advisor. Rather than advocating for a particular solution, NYSDEC has tried to provide factual information about deer and deer management and make suggestions about how to proceed with locally led decision making.

Universities. Individuals from the State University of New York College of Environmental Sciences and Forestry (SUNY ESF) and Cornell University attended some meetings focused on deer and served primarily as technical advisors. At one point, SUNY ESF also entered into discussions with the town, village, and park about the possibility of conducting a study on the local deer herd to gather information that could contribute to decision making.

### **Sequence of Events**

In 2004, one resident approached a local state assemblyman, the town supervisor of Manlius, and the mayor of Fayetteville with concerns about deer. Subsequently, two public meetings were held (initiated by the state assemblyman) and approximately 20 residents attended each meeting. NYSDEC and university personnel attended to answer technical questions.

After these initial meetings, a series of meetings and discussions ensued involving the town, village, and park with individuals from NYSDEC or universities attending as necessary. These meetings focused on discussing what, if any, action was needed to address the negative impacts of the local deer herd. As part of their effort to better understand the scope of the problem, local officials considered contracting with SUNY ESF to conduct a study that would document the nature of the problem and identify areas where deer-related impacts were particularly severe. Funding was never identified to support this study, so the idea for it was abandoned.

From the perspective of some individuals involved in these meetings, the deer issue started to be viewed as a park issue – in part because the park managed such a large land area and was perceived to be the locus of the deer population and in part because park personnel were willing to consider efforts to control the deer herd. The Fish and Wildlife Management Board made a formal request to the New York State Office of Parks, Recreation and Historic Preservation to allow bowhunting to take place in Green Lakes State Park during this period. This proposal was generally portrayed as an opportunity to provide additional recreational opportunities within the park, as opposed to a method to control deer. When local residents became aware of this proposal, “hundreds and hundreds” of telephone calls opposing it were received by Green Lakes State Park. In the spring of 2006, Green Lakes State Park announced that it would not allow hunting in the park but would continue to evaluate options for managing the deer herd.

Given that the deer management issue had largely been framed as a park issue, this decision interfered with the town and village’s efforts to address residents’ concerns about deer.

*Unfortunately ... all of the focus went onto state parks and they were talking about having controlled hunting at Green Lake State Park and there were a couple of newspaper articles with big, flashy headlines that got people agitated or excited... Probably three months ago the State Parks director handed it back to me, put it in my lap and said, “Maybe we’ll still look at doing something like this*

*in the future but for now we're not going to be doing that." We're kind of back to square one.*

They concluded that they would need to demonstrate a strong local desire for deer control to gain sufficient support for action on the issue. The town subsequently appointed a deer task force, to be led by one of the town counselors, to study the deer management problem and recommend responses to it. The task force began meeting, but these meetings eventually ceased without any report or decision produced. The cessation of the meetings appeared to be rooted in a lack of strong interest on the part of participants rather than substantive disagreement about the issues.

In the summer of 2009, Green Lakes State Park announced that it would be developing a new master plan for the park. Park staff called a meeting to solicit input about issues of concern associated with the park. Although a variety of issues were discussed at this initial meeting, concerns both about deer and about deer hunting taking place in the park were the most discussed themes. The development of this plan is currently underway.

### **Factors Influencing Capacity**

Relationships/Dialogue. The relationships and dialogue between the three key players (the town, the village, and the park) have generally been constructive. All parties have shown a willingness to engage in discussions about deer management over a period of several years, although these discussions have been intermittent. Even turnover in the town supervisor and park manager positions has not seemed to undermine this dialogue. On the other hand, the town counselor who chaired the town deer task force left office in December 2009, and his departure may undermine any efforts to resurrect the task force as a forum for citizen dialogue on the topic.

Dialogue among local residents has been less constructive. Although relationships between residents have not obviously been characterized by hostility, strongly divergent opinions regarding deer management in the park have been expressed. Although public meetings orchestrated by the town, village, and park have given residents an opportunity to express their opinions, such meetings do not typically serve as productive forums for exploring similarities and differences in interests and attempting to identify common ground. The town's deer task force had the potential to serve as such a forum, but for whatever reason did not seem to have the ability to sustain itself.

Agreement. Town and village officials seem to be sympathetic to concerns about the need for deer control. Green Lakes State Park has been willing to consider the possibility that deer need to be controlled, but does not appear to have accepted that conclusion yet. Park staff have questioned publicly whether deer are having negative impacts on the park ecosystem despite the fact that NYSDEC staff have stated publicly that ecosystem damage in the park is clear. Even if the park reached agreement with other key stakeholders about the need for deer control, they would have to reach agreement about the need for the park to be involved in those efforts and the specific deer control methods that should be used. To date, the park has concluded that hunting is not an allowable use

of the park, but that decision is up for reconsideration in the development of the park's new master plan.

As stated above, residents' opinions about hunting in the park have been divided. Town and village officials had formerly concluded that they would have to be able to demonstrate public desire for deer control for management efforts to move forward.

Legitimacy. The organizations with the most legitimacy to address local deer management concerns are the town and village government and Green Lakes State Park (as the largest landowner). Given the amount of undeveloped land owned by the park, it will likely have to participate actively in any effort to address deer problems in order for that effort to be successful. The process of developing a new master plan, given the associated opportunities for public involvement, may help the park to legitimize any decisions it makes about its future involvement in deer management.

NYSDEC must agree to any deer management actions implemented locally. The agency has been willing, however, to consider a variety of management options provided that those options have the support of local authorities.

Public support is also necessary to legitimize management efforts and, to date, that support has been insufficient.

*I don't know what the end result is going to be but it seems obvious that if we're going to get any kind of help addressing the issue we're going to need to show that citizens really feel that this is a problem that needs to be addressed.*

Despite strong (and growing) concerns about the local deer herd, opposition to hunting in the park has been strong while engagement of deer management advocates has been inconsistent.

*To be very honest, I only ever heard from one resident about this issue but that doesn't mean there was only one resident concerned. I think he represented some group of residents throughout the town and village that had a similar concern ...but it's not something that my phone ever rings off the hook about, by any means.*

Information. Despite the perception of widespread impacts from deer, some key stakeholders believe that population estimates of the deer herd are necessary before any deer management action can take place. Although experts often argue that accurate deer counts are unnecessary (because the impacts of deer that are the primary concern), many local communities are uncomfortable making deer management decisions without population estimates.

The reasons for local opposition to hunting in the park are not entirely clear, and these reasons may be important. Opposition to hunting may occur because people believe either that hunting is incompatible with other local activities or that hunting is unethical.

While neither of these concerns may be easily resolved, concerns about hunting's compatibility with other activities are often more straightforward to address. Sometimes hunting programs (or other deer control programs) can be managed in such a way that conflicts with other activities are kept to an absolute minimum.

Funding. Given that no management actions have been identified yet, funding has not been a major constraint to this point. However, a lack of funding prevented SUNY ESF from leading a study that would have produced information considered important in local decision making.

Leadership. Although a number of individuals played an active role in deer management discussions, no clear leader who was committed to seeing the issue addressed emerged. The staff of Green Lakes State Park, who had the legitimacy to address the issue because of the amount of land they controlled, were ambivalent about whether deer control was needed. Local elected officials appeared to be more willing to develop a deer control program, but felt that their options were limited without the involvement of the park. Although local citizens were concerned about deer, none were committed enough to the issue to stay consistently involved in it.

### **Social Network Analysis**

The actors in our social network analysis were official government bodies or positions (rather than individuals). Figure 2 reflects the strengths of the linkages between each pair of local actors based on the number of common information sources they shared. The diagram reflects a fairly cohesive set of actors. The three actors who are most strongly linked are the town of Manlius, the village of Fayetteville, and Green Lakes State Park. These three actors are the authorities who would have to agree on and cooperate to implement any deer management plan. Each operates in a similar information environment.

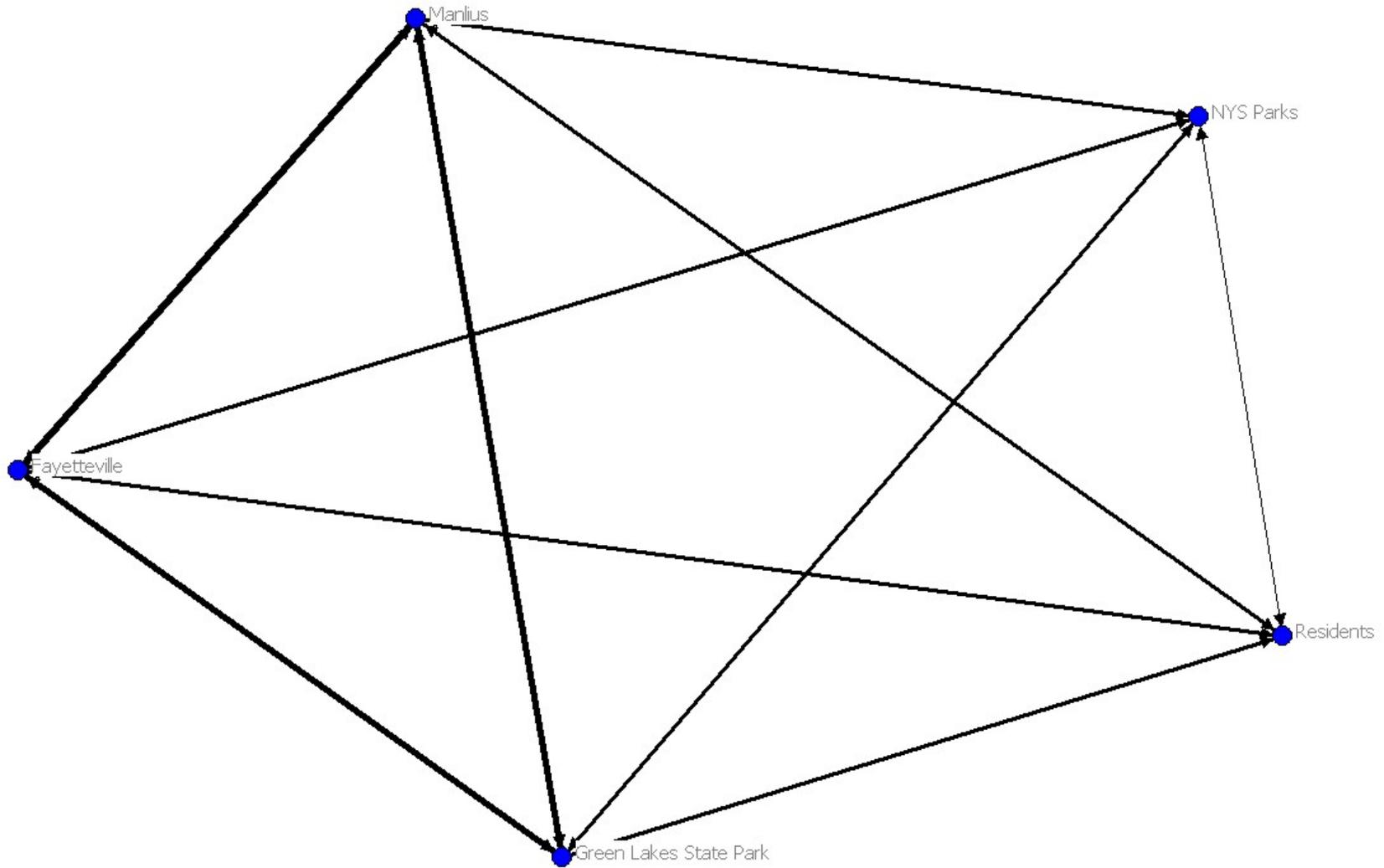
### **Overall Assessment**

A lack of consensus among key players about deer management needs is constraining additional action related to deer management at this point. This lack of consensus operates at two levels. Disagreement exists between the town and village on the one hand and the park on the other about whether the impacts of deer are great enough to warrant population control and what actions would be important to control the population if they were. There is disagreement among local residents about whether the need to reduce deer-related impacts justifies disrupting other uses of the park through deer management actions.

The development of the Green Lakes State Park master plan provides an opportunity to further explore these issues and legitimize any deer management decisions. Continued coordinated study and planning by the town and village and the park will be important throughout this period. Given that citizen support will be necessary to legitimize any

deer management actions, developing an appropriate forum for citizens to discuss similar and different interests may be important as well.

**Figure 2.** Social network map of deer management stakeholders in Manlius. Lines indicate stakeholders shared common sources of information, and the thickness of lines indicates the number of common sources of information.



## **Greenburgh Case Description**

Greenburgh is a town of approximately 87,000 people in western Westchester County, New York, 25 miles north of New York City. It contains 6 villages, each with a government separate from the town's. Westchester County has a long history of concern about deer and their impacts. A number of significant natural areas, parks, and golf courses serve as refugia for deer. Primary concerns include Lyme disease, automobile accidents, environmental impacts, and property damage. These concerns began to intensify in Greenburgh around 2002.

### **Key Stakeholders**

Town Supervisor. The current town supervisor in Greenburgh has been in that position since 1991. Although some local residents concerned about deer perceived him as “a little hesitant to get involved because of politics and the animals rights group,” he initiated the Greenburgh Deer Committee in 2004 and asked the group to study the deer problem in the town and recommend solutions.

Village Mayors and Boards. The elected officials in the villages within Greenburgh have changed periodically – and so has their level of interest in addressing deer problems. At points, some of the villages have actively considered initiating deer management programs. Irvington formed a committee of interested citizens to discuss the problem. Hastings asked its Conservation Commission to study the issue. At other points, they have been perceived by local residents as wanting to avoid the issue:

*Our mayor is very, very leery of incurring the wrath of any animal rights group... We tried several times to set up appointments. Finally he agreed and the mayor of Dobbs Ferry agreed that they would come to the meeting with the DEC. The DEC sent four of their people here. Neither mayor appeared.*

Westchester County Department of Parks, Recreation and Conservation. The county parks department manages nearly 50 parks and recreation areas in the county encompassing 18,000 acres. Concern about deer and their negative impacts on the environment has been strong within the parks department.

Greenburgh Deer Committee. The Greenburgh Deer Committee was formed in 2004 to study and recommend solutions to deer-related problems in the county. Any interested town resident could serve on the committee, and therefore it included individuals with very different perspectives about deer. The co-chairs of the committee both strongly favored action to reduce deer-related impacts.

Westchester County Forest Regeneration Task Force. Because of ongoing concerns about the impacts of deer on the ecosystem in Westchester County, a task force was appointed by the county executive to study the problem and recommend actions in 2006. This task force included both agency representatives and interested individuals. They released a

report in October 2008 recommending expanded hunting and culling throughout Westchester County.

Local Residents. Level of interest in deer among local residents has been high. Some local residents have been primarily concerned about negative deer-related impacts and have been consistently involved in advocating for action to address the issue. Another group of local residents have been concerned primarily about preventing lethal action from being used to control the deer herd. These individuals have been most engaged in discussions when lethal control has been under active consideration. Local residents have served on committees and task forces and been elected to positions in local government.

New York State Department of Environmental Conservation. The state wildlife management agency has served primarily as a technical and process advisor. Rather than advocating for a particular solution, NYSDEC has tried to provide factual information about deer and deer management and make suggestions about how to proceed with locally led decision making.

### **Sequence of Events**

Although concerns about deer in Westchester County have existed for years, Greenburgh residents began to advocate more actively for management action to reduce deer-related problems around 2002. Most of this advocacy was directed at elected officials at the town and village level.

The conservation commission of one village in the town, Hastings-on-Hudson, held a special meeting to discuss the deer overpopulation and how it was affecting the environment. Greenburgh's town supervisor was invited to and attended that meeting. Because of the concerns about deer aired at the meeting, the town supervisor formed the Greenburgh Deer Committee to study and recommend solutions to deer-related problems.

The committee began meeting in September 2004 and met until May 2005. Many people perceived these meetings to be acrimonious. The committee was chaired by two individuals who favored deer control: a scientist who also served on Hastings-on-Hudson's conservation commission and a local resident whose teenaged daughter was seriously ill with Lyme disease. However, because any local resident who wanted could join the committee, its membership also included individuals who were primarily concerned about deer welfare. The committee had marked disagreements about whether deer needed to be controlled and how they could be controlled.

As part of their work, the committee conducted a survey of local residents to assess their opinions about deer. One member of the committee noted that "technically it was not a scientific questionnaire." It was distributed by committee members in libraries, stores, and other public places. Some individuals (even some who were in favor of deer control) perceived the survey to be biased. (For example, the first sentence in the survey referred to "the effects of the startling increase in the deer population in our Town.") A total of 568 completed questionnaires were returned to the town.

The committee did not release a report until July 2009, several years after their last meeting. The report concluded that deer were a serious problem in Greenburgh and that lethal management methods to cull the herd were needed. It was authored by the committee's co-chairs. Although it reflected "what the Chairs perceived were widely held views" on the committee, it was not submitted to approval by the full committee before it was released. The co-chairs believed a committee vote on the report was inappropriate because "the membership was self-selected rather than by accepted statistical procedures." The co-chairs note that: "a small minority declared they were animal lovers and objected strenuously and adamantly to any action that might remove deer from our environment."

During the period when the Greenburgh Deer Committee was engaged in its deliberations, discussions about deer were also taking place at the village and county level. The Village of Dobbs Ferry seriously considered culling deer in 2005, but when opposition to the use of lethal control methods began to surface the Village Board decided to table the idea and wait for the Greenburgh Deer Committee to produce its report.

Meanwhile, discussions about deer were also taking place at the county level. In a May 2005 conference on "Conserving Local Landscapes," many attendees expressed concerns about the impacts of deer on the environment. Consequently, a follow up conference on deer and the environment was held in November of that year. After the conference, the Westchester County Executive appointed the Westchester County Forest Regeneration Task Force to further study the issue. The task force began meeting in 2006 and published its final report in 2008. It focused on the environmental impacts of deer – their effects on forest regeneration, water quality, and biodiversity. It recommended expanding hunting and culling throughout Westchester County.

Currently, no management plans are under active consideration by the Town of Greenburgh, although Hastings-on-Hudson is working on a deer management plan.

### **Factors Influencing Capacity**

Relationships/Dialogue. Most of the dialogue about deer management at the town level took place on the Greenburgh Deer Committee. Several individuals who were members of the committee believed this dialogue was often unproductive and relationships between committee members were acrimonious. They attributed these problems to several factors. One was the sheer size of the committee:

*Before we knew it we were well over 50 people and obviously that makes it very difficult to work as a committee.*

A second reason was the diversity of opinions on the committee – with a split between those favoring deer control and those concerned about deer welfare – and a perceived lack of willingness of some members to listen to other perspectives.

*We had a problem with the self-professed animal rights people. They were very extreme and were not willing to even engage in conversation of possible methods, such as calling for anything that might have to do with taking the animal's life... It impeded a lot of our progress ...it took up a lot of our time. We wouldn't get anywhere and we were spinning our wheels. It turned off a lot of people who were interested in getting something done. Some of them dropped out and wouldn't even come to the meetings anymore.*

On the other hand, those favoring deer control recognized that the deer welfare advocates “felt like they were left out.” This feeling may have been exacerbated by how the committee was run. One of the chairs believed that because any local resident could join the committee its membership did not reflect the community as a whole, and decisions about what should and should not be included in the report should not be made by the committee but by the chairs:

*Because it was self-selected ... I saw that this was not the place for a vote ... because ... some of the people were set in advance, no matter what.*

Consequently, some members of the committee argued that the report reflected the perspectives of the chairs only, and not the group as a whole.

*The members don't agree on the report. I heard one member say, “Well, the person who wrote it did it all on his own” and felt these were all his opinions and not committee opinions. It's very controversial.*

In reaction, those members most concerned about deer welfare took steps which were perceived as efforts to stymie the work of the group:

*They brought in somebody with a videotape camera to videotape our proceedings ... These were the animal rights people. They put a really cold feeling on the group. People stopped showing up. They didn't want to talk before the camera and so forth. We had said that all of this was, of course, confidential. We are talking among ourselves.*

Agreement. Given the diversity of opinions represented on the committee and the perceived lack of constructive dialogue, the committee had difficulty reaching agreement on a final set of recommendations:

*They were caught up in their underwear and still are, to my knowledge... This commission has been in place for two and a half years already.*

In addition to this lack of agreement on the committee, no clear consensus existed among local elected officials that deer management was needed. While they recognized that deer problems existed, they also recognized significant opposition to deer control existed. Some residents perceived them as being unwilling to take the political risks necessary to initiate a deer management program:

*I think that the politicians don't like to deal with this issue because you have to deal with animal rights people and they want to get reelected.*

Legitimacy. NYSDEC as the state authority responsible for deer management also must agree to any deer management actions implemented locally. The agency has been willing to consider a variety of management options provided that those options have the support of local authorities.

Therefore, local elected officials at the town, village, and county levels have the legitimacy to initiate deer management. Because the jurisdiction of the town, villages, and county overlap, decision making has been complicated. Some have accused local officials of “passing the buck” to avoid making politically unpopular decisions. When opposition to a deer culling plan being considered by the Dobbs Ferry Village Board surfaced, the board decided to wait for the Town of Greenburgh to come up with a set of recommendations before proceeding:

*The board suddenly decided, “We think it’s an interesting idea. We understand the significant community opposition. Let’s see what the Town of Greenburgh comes back with and we’ll revisit this.”*

Public support is also necessary to legitimize management efforts and, to date, officials have been uncertain as to whether that support is sufficient.

Information. One barrier the Greenburgh Deer Committee faced in its decision making was a lack of information about how many deer were in the town. They hoped to do a survey of deer by air:

*We feel that it’s important to have the overhead flight because if you’re educating the public as to what is going on then they have to know...and ...if you’re going to go out and ...get rid of animals ...then you want to take the right amount. You don’t want to take too much and you don’t want to take too little because that’s going to not solve your problem.*

However, NYSDEC maintained that knowing the actual number of deer was unimportant if you knew that the impacts of deer were excessive. This argument was accepted by some of the stakeholders in the town.

*In the meantime the town-wide effort is tied up in its underwear trying to do an infrared survey so they can pinpoint how many deer there are and where they are. And [NYSDEC] is telling us, “That’s cute, but it doesn’t get you anything. You know they’re overpopulated. Reduce the population. It either fixes it or you reduce them more.” That just made such common sense to me and instead these people are running around trying to find thirty grand to do an infrared survey.*

The deer survey never took place because of a lack of funding.

The other key area which has hindered deer management decision making has been a lack of accepted information about local attitudes toward deer and deer management. Local elected officials seem reluctant to take management action without sufficient indication of support among local residents. Although the deer committee conducted a survey, some individuals considered both the wording of the questionnaire and the method of implementing the survey as inadequate for providing an unbiased reflection of public opinion.

Leadership. Although a number of individuals were strongly concerned about deer in Greenburgh and committed to seeing deer-related problems addressed, none has yet emerged as a leader capable of fostering action. Local elected officials have been ambivalent about the need for deer control. The leadership of the Greenburgh Deer Committee, which was probably in the best position to promote action, was perceived as ineffective at fostering positive working relationships and constructive dialogue between stakeholders. Other individuals who may have had the skills to promote these relationships and dialogue were not in a position that gave them the legitimacy to do so.

### **Social Network Analysis**

In Greenburgh, our social network analysis focused on individuals because our key informants believed that approach would most accurately capture the dynamics of local deer management discussions. Figure 3 reflects the strengths of the linkages between each pair of local stakeholders based on the number of common information sources they shared. The largest group of individuals in the network (residents 1, 3, 4, 5, 6, and 7 in the diagram), and the group that was most strongly connected with each other, were local residents favoring deer control. The single resident concerned primarily about deer welfare who played a significant role in these discussions (resident 2) was very weakly linked to the rest of the network. The information sources on which she relied were very different from those on which the other stakeholders relied. The two co-chairs of the Greenburgh Deer Committee, and in particular the one of them who played the largest role in drafting the deer committee's report, were also not strongly connected with the rest of the network. They shared relatively few sources of information with other stakeholders. The town supervisor, who ultimately would play a key role in deciding whether and how deer were managed, was primarily linked to the rest of the network through the deer committee's co-chairs.

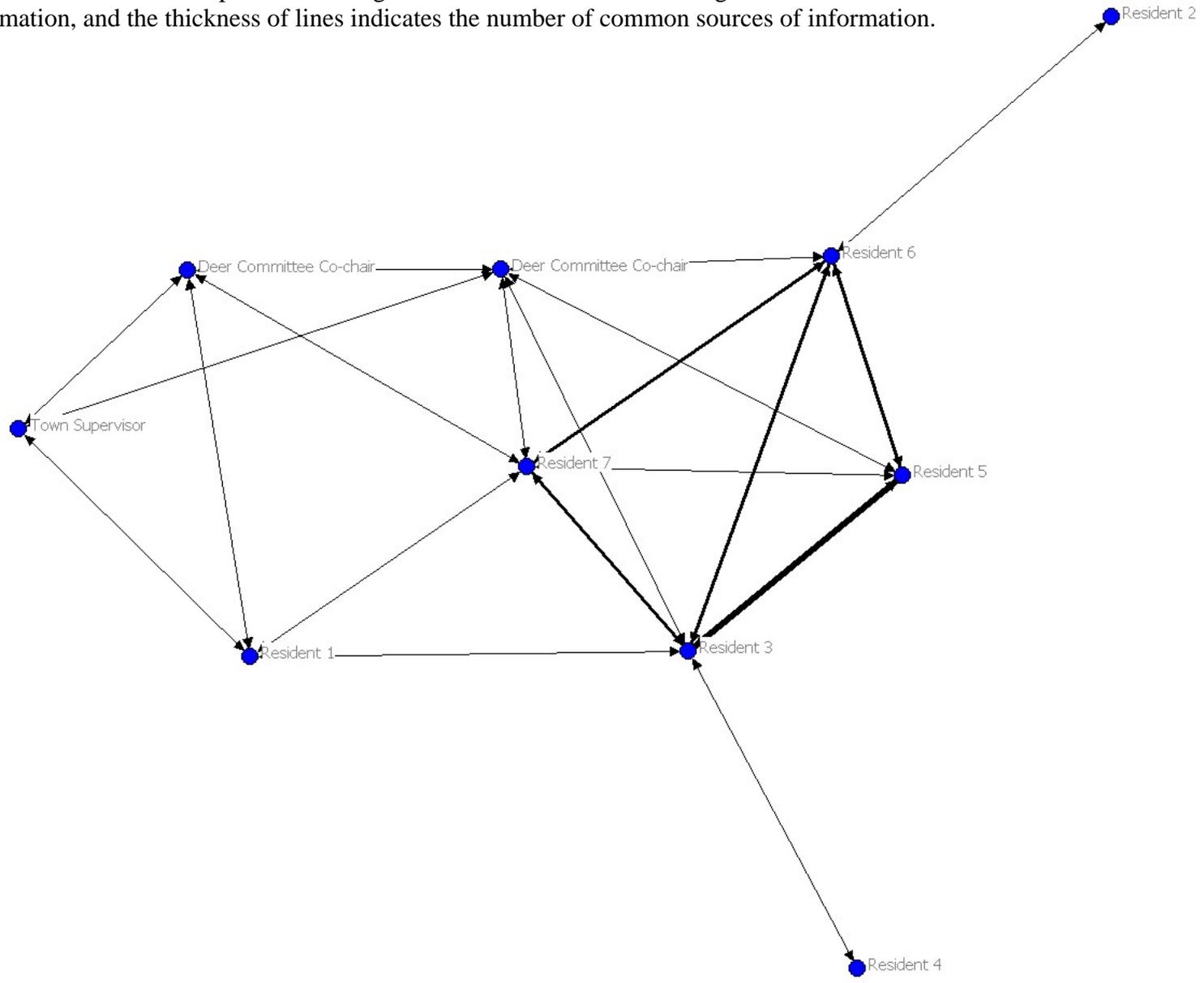
### **Overall Assessment**

The Greenburgh Deer Committee provided an opportunity to further discussions about deer management in the community but was perceived as exacerbating existing differences. The committee process was criticized by some of our respondents for several reasons: (1) the membership was too large; (2) one of the chairs was perceived as biased; (3) the chairs, and not the committee as a whole, decided what should be included in the final report; and (4) some members of the committee were perceived as more

interested in blocking any action to address concerns about deer-related problems then they were in engaging in meaningful dialogue.

Recent decisions at the county and village level, however, may provide impetus for further decision making about deer management in Greenburgh. Certainly continued dialogue about deer management among the various levels of local government seems important given the overlap in their authorities. If town officials are still uncomfortable with making deer management decisions without a better measure of public opinion, a second survey, without the perceived flaws of the original survey, may provide them with the information that they need.

**Figure 3.** Social network map of deer management stakeholders in Greenburgh. Lines indicate stakeholders shared common sources of information, and the thickness of lines indicates the number of common sources of information.



## Cross Case Comparison

Comparing results across the cases allows us to begin to identify generalizations about the characteristics of communities that influence capacity for urban and suburban deer management. These characteristics fall into three general categories: stakeholder characteristics, leadership, and social networks.

### Stakeholder Characteristics

Based on the literature, we identified three important stakeholder characteristics: power, legitimacy, and urgency. Based on our results, we drew conclusions about how these characteristics manifest themselves in community-based management issues.

**Power** refers to the ability to make certain outcomes occur. In community-based deer management, power is associated with the ability to provide resources. These resources could be financial (funding for deer management) or information (needed to make deer management decisions). Because none of the communities we studied have decided to implement deer management actions yet, funding for management actions has had little influence on deer management issue evolution (although it could conceivably be a critical factor at a later stage). A lack of funding, however, did impede research on the local deer population in Manlius and may have constrained decision-making in the other communities in ways of which we were not aware. Typically, funding for community-based deer management comes from local government or managers of large land parcels (such as parks), although it may come from individual citizens, too.

A resource that played a much larger role in the evolution of our cases was information. Few of the local stakeholders that became involved in deer management discussions had any initial expertise in deer population dynamics or deer management. Many of them, however, worked to develop their knowledge by cultivating relationships with individuals outside of the community: government deer biologists, university scientists, representatives of other communities with deer management experience, and nongovernmental organizations. In addition, many of them also conducted research on their own over the internet. In both Greenburgh and Rye, efforts to cultivate additional knowledge by surveying public opinion and conducting a census of the deer population were made. None of the individuals interviewed argued that the knowledge needed to make deer management decisions was a limiting factor.

On the other hand, lack of knowledge about how to conduct an effective public policy making process appeared to constrain local deer management decision making, particularly in Greenburgh. The functioning of the Greenburgh Deer Committee was widely criticized with criticism leveled at both the composition and functioning of the committee. Additional information about how best to foster dialogue and reach agreement about contentious issues may help to remove one obstacle to the development of community-based deer management policy.

**Legitimacy**, which is often but not always associated with power, is a characteristic of stakeholders who are acknowledged to have an appropriate role in a given context. In community-based deer management, stakeholders who provide legitimacy include those who have the legal authority to approve or block deer management actions or sufficient political influence to do so. Several types of stakeholders have legitimacy. State wildlife agencies have the ultimate authority to determine deer management actions, but in community-based deer management they often specify the parameters for management actions they would be willing to approve and allow local communities to make decisions within those parameters. NYSDEC took this approach in the three communities we studied.

Local government officials have no authority over deer management, but local laws often regulate the discharge of firearms and sometimes bows. Many communities need to modify local laws to allow deer management to occur; therefore, local elected officials are frequently key decision makers in community-based deer management. Local elected officials were involved in all three of our cases. In Manlius, they played the most direct role with the town supervisor of Manlius and the mayor of Fayetteville negotiating with Green Lakes State Park to try to reach deer management decisions and a town board member chairing the citizen task force that was created to make deer management recommendations. In Rye and Greenburgh elected officials were not directly involved in reaching deer management decisions but they helped to create task forces to make deer management recommendations. Given their critical role in approving deer management actions, the involvement of elected officials is clearly important.

Because of the fragmentation of land ownership in most urban and suburban communities, large land owners, who have authority over actions that take place on their lands (within the laws of the jurisdiction in which the land is located), play a particularly important role in legitimizing deer management. Often there are large parcels such as parks, golf courses, or natural areas that may be important to include in deer management because conducting management on a multitude of small parcels is impractical. These large parcels may be controlled by local, state, or federal agencies, nongovernmental organizations, or even private individuals. The importance of large landowners was most obvious in Manlius because Green Lakes State Park was viewed as a locus of the local deer herd and necessary to include in any deer management actions.

**Urgency** refers to the importance of outcomes to stakeholders. In natural resource management, stakeholders with urgency are those to whom management outcomes are important. Collectively, the urgency of local residents is perhaps the most important influence on deer management. Although they do not make decisions as individuals, the pressures they exert on elected officials and land managers plays a key role in the development of deer management policy. The urgency of local residents was influential in all of the cases we studied. In Greenburgh, some residents were very strongly in favor of deer control, but others were equally strongly opposed to any kind of lethal management because of concerns about deer welfare. In Manlius, some residents favored deer control, but few maintained a sustained engagement with the issue and sustained pressure on public officials. In addition, recreational users of Green Lakes State Park

were opposed to lethal management actions in the park, which they believed would interfere with other uses. In Rye, concern about deer existed, but local sentiment in favor of deer control was not particularly strong.

The reasons for opposition to deer management may be important to whether and how they are resolved. Opposition to deer management which is rooted in concerns about how management will affect other uses (such as recreational uses of parks) is likely easier to address than concerns about deer welfare. It is possible to imagine lethal deer management actions orchestrated in such a way that they do not interfere with other uses because of their timing, location, or other restrictions. Lethal management actions will always raise concerns among those opposed to killing deer, however.

In situations where local residents' opinions are mixed, local elected officials and managers of public multi-use parcels are in a difficult situation. They must balance urgency about deer against urgency about other concerns (such as deer welfare and recreational uses). In addition, individuals who want to remain elected officials have some urgency about being reelected, and they may see their engagement in a controversial issue as jeopardizing their reelection prospects.

### **Leadership**

Past research (Lauber et al. 2009) has found that effective leaders in local wildlife management efforts: (1) were viewed as having a legitimate role in the issue by other stakeholders; (2) were committed to seeing the issue addressed; (3) recognized what actions or resources would contribute towards progress on the issue; and (4) paid particular attention to building relationships and promoting dialogue among key stakeholders. In the cases we studied, leaders or potential leaders had some of these characteristics, but were missing others. In all cases, individuals who had the legitimacy to address the issue were present, including elected and appointed local officials, land managers, and residents appointed to task forces. Some of these individuals, however, were not sufficiently committed to seeing deer-related problems addressed. For example, in Manlius, Green Lakes State Park was willing to engage in deliberations about deer management but was not convinced that management was needed. Others were committed to seeing the issues addressed, but paid insufficient attention to relationship-building and fostering dialogue and lacked adequate understanding of how to build sufficient support for decisions.

### **Social Networks**

The success of local deer management depends not just on the types of stakeholders involved, but how they relate to each other. Inadequate networks reflect an inadequate process of engaging stakeholders in deer management discussions. Based on an analysis of our three communities, we can identify commonalities in our findings about these relationships.

- Involving individuals with legitimacy (e.g., local elected officials and land managers) as central figures in the networks is important. In both Rye and Manlius, local elected officials played central roles, either participating in deer management discussions or staying well abreast of them. In Greenburgh, the only local official represented in the network was the town manager who was somewhat peripheral to the discussions taking place, maintaining a connection to them primarily through the deer committee co-chairs.
- Local citizens must be involved in deer management discussions. Local citizens were central to discussions in Greenburgh both individually and through participation in the task force. Local residents also participated in task forces in Rye and Manlius, although the task force in Manlius eventually stopped meeting without making any final recommendations. Not surprisingly, Manlius had no local citizens represented in the social network map of individuals and organizations playing a key role in decision making.
- Closely related to this point, task forces were a common way to involve local citizens in deer management discussions. However, some task forces were more effective than others. The Manlius task force lacked sufficient sustained interest. The Greenburgh task force was perceived to lack effective facilitation.
- Interactions between those with diverse views must take place. The individuals most central to the Greenburgh discussions were individual citizens advocating for deer management control. The leading individual concerned about deer welfare was not strongly connected to these other individuals. Nor were any residents other than the deer committee co-chairs strongly connected to the town supervisor who would ultimately play a critical role in determining whether and what type of deer management would take place.

### **Fostering Issue Evolution**

The purpose of this research was to help determine how to facilitate deer management decision making and action in urban and suburban communities. Based both on theory and our analysis of cases, we have identified six possible barriers to deer management.

#### **Inadequate Stakeholder Engagement**

One of the most important barriers to deer management is inadequate stakeholder engagement. As reflected in our results, decision-making processes might not include all key stakeholders (those with power, legitimacy, and urgency). State wildlife managers working to facilitate local deer management efforts can consider what key types of power, legitimacy, and urgency exist in a given community and whether individuals and organizations with those characteristics are engaged. Key questions to guide this process include:

Power: Are those most likely to fund local deer management (elected officials and large public landowners) involved in the process to some degree? Are individuals with sufficient knowledge about public policy decision-making processes involved? Are state

wildlife biologists, university personnel, or others with expertise about deer biology helping to inform discussions?

Legitimacy: Are local elected officials, with the legitimacy to modify local laws and regulations (to either expand or restrict deer management options), engaged in discussions? Are large public and private landowners with control over lands with deer engaged?

Urgency: What are the key concerns about deer management (both those supportive of deer control and those concerned about it) in the community? Are individuals with those concerns engaged in discussions?

### **Ineffective Process**

Not only can deer management discussions be undermined if all key stakeholders are not involved, but they also can be undermined if the process of involving them is not effective. While no formula exists for identifying stakeholders and designing a decision-making process, several considerations can inform process design.

The process should be effective at promoting a free flow of information between all key stakeholders (rather than having discussions limited to particular subgroups). Although information should freely flow between stakeholders, not every stakeholder has to be engaged in every part of the discussions. Stakeholders with urgency (strong concerns related to deer management) likely need to be most actively engaged in discussions developing policy alternatives. These discussions should be informed by an understanding of effective policy making processes and of deer management and biology, but those individuals contributing this understanding do not necessarily have to be involved in making the actual decisions. Individuals and organizations in a position to fund and legitimize management need to be aware of, informed about, and support of discussions, but do not necessarily need to be active participants.

### **Lack of Leadership**

Closely related to the design of the decision-making process is the effectiveness of leadership of the process. Effective leaders need to be viewed as legitimate by other stakeholders, committed to making a decision about whether and how to address deer-related problems, aware of the actions and resources needed to further decision-making and action on the issue, and willing to invest in relationship-building and dialogue. Leaders and potential leaders may have some of these characteristics, but not others.

### **Disagreement about Need**

Even with effective stakeholder engagement and process design, a community might not reach agreement easily. Disagreement could exist about: (1) whether deer control is needed; or (2) whether deer control is a higher priority than other considerations (deer welfare, recreational use of natural areas, etc.). It is important to assess not only whether

disagreement exists, but why, because some types of disagreement are easier to address than others.

### **Deer Control Unnecessary**

A community may reach agreement about deer management, but their conclusion may be that deer control is not needed. This situation existed in Rye, and, while it may be a barrier to deer management, it is not indicative of a problem.

### **Disagreement about Methods**

Local decision makers might not have been able to identify the most appropriate methods for controlling deer. Because none of the communities we studied had concluded that deer control was needed, this barrier was not noted in any of our cases.

## **CONCLUSIONS AND IMPLICATIONS**

The purpose of this research was to contribute to understanding how state wildlife management agencies can help to facilitate community-based deer management. In particular, it was intended to increase understanding of the community characteristics that contribute to capacity for managing deer. However, no consistent recipe for building community capacity exists. Each community has unique needs and constraints. Wildlife managers can not simply push the right buttons and have deer management take place. Rather, managers must consider a series of key questions, such as those we provided, to analyze capacity needs on a case-by-case basis.

One of the keys to assisting communities in their decision making is to recognize that deer management is a learning process. Because part of this learning involves coming to agreement as a community about how important deer control is compared to other community concerns, one community can not simply adopt the lessons learned by another. Rather each community will have to engage in their own learning process, and the resolution of these issues will take time. Furthermore, a decision not to control deer (or even not making any decision at all) at a particular point in time is not necessarily an indication of failure but simply another step in the learning process.

Continued monitoring of deer management efforts in Rye, Manlius, and Greenburgh may be fruitful. Given the data collected to date, a foundation exists for understanding any further issue evolution in these communities. In addition, it may be worthwhile to develop future studies to explore the needs and perspectives of those local stakeholders with the greatest legitimacy in deer (and other wildlife) management issues – local elected officials and managers of large land parcels. Little research attention has been directed towards these groups in the past, but the degree of influence and control they have over wildlife management makes them well worth understanding. Also, inquiring into community expectations about who should provide leadership for community-based deer management – elected officials, grass-roots entities, or NYSDEC – may be helpful

in future situations given leadership has been identified as a key component in other studies and was apparent as a factor in the three cases we examined.

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