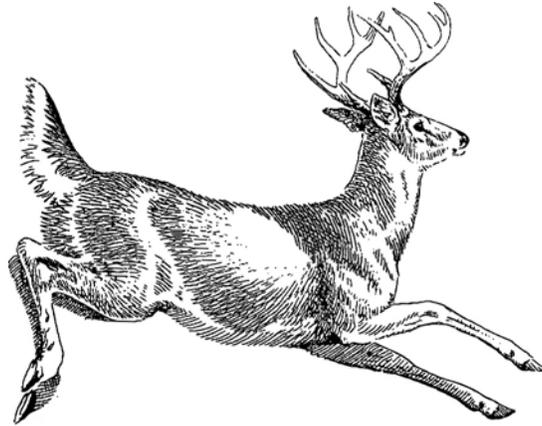


**LANDOWNER AND HUNTER RESPONSE
TO IMPLEMENTATION OF A QUALITY DEER MANAGEMENT (QDM)
COOPERATIVE NEAR KING FERRY, NEW YORK**



**BY
Jody W. Enck
Tommy L. Brown
David Reihlman**

HDRU series report 03-7

ACKNOWLEDGEMENTS

We greatly appreciate the support of several staff from the New York State Department of Environmental Conservation, Bureau of Wildlife, including Wayne Masters, Dick Henry, and George Mattfeld. We are especially grateful to the many landowners and hunters who met in small groups to help us better understand why certain management outcomes are desired and others intolerable. We thank members of the King Ferry volunteer fire department for use of their facility for the small group discussions.

Several staff from the Human Dimensions Research Unit at Cornell University provided assistance with the small group discussions, including: Bill Siemer, Karlene Smith, and Tania Schusler. Karlene Smith also assisted with implementation of the mail surveys. Margie Peech provided secretarial support and helped to develop some of the figures in the report.

This report is a contribution of New York Federal Aid in Wildlife Restoration Grant WE-173G, Sub-grant W-146-R, and a contribution of USDA Hatch grant 147-403.

TABLE OF CONTENTS

ACKNOWLEDGMENTS	2
EXECUTIVE SUMMARY	9
INTRODUCTION	12
Research Objectives.....	12
Organization of Report	13
METHODS	13
Meetings with Hunters and Landowners	13
RESULTS	14
What are the Characteristics of Landowners Participating in the QDM Cooperative?	14
What are the Characteristics of Hunters Participating in the QDM Cooperative?	16
What do Landowners Want from QDM?.....	18
What do Hunters Want from QDM?.....	19
What do Hunters Assume About the Deer Management System that Leads Them to Believe That Certain Outcomes will Happen if QDM is Implemented?.....	23
What <i>Fundamental Ends</i> do Hunters Associate with Desired Management Outcomes.....	26
How Well Did the Small Groups Reflect the Thoughts of All Hunters About the Deer Management System and Impacts They Want Managed as Fundamental Ends of That System?	28
Which Impacts Do Landowners and Hunters Think are Most Likely to be Achieved Under QDM vs. Conventional Deer Management (CDM)?.....	32
What are Desired/Acceptable Levels of Impacts for Landowners and Hunters, and How Do Existing Levels Differ From These Levels?.....	38
What Kind of <i>Social Learning</i> among Participants Would be Beneficial Prior To Making Decisions about New “Alternative Management Actions” to Implement as Part of QDM?	43
What is the Hypothesized Model of the Deer Management System for the Impact Referred to as “Fairness Among Hunters?”	48
What is the Hypothesized Model of the Deer Management System for the Impact Referred to as “Naturalness of the Deer Population?”	56
What Alternative Management Actions are Landowners Willing to Implement, And Would They be Successful Based on the Revised Conception of the Deer Management System?	60
What Were Baseline Levels of Satisfaction and Willingness to Continue with QDM?	62
CONCLUSIONS.....	63
LITERATURE CITED	66
APPENDIX A.....	67

LIST OF TABLES

Table No.	Title	Page
1	Persons allowed to hunt on private properties before and after the properties were enrolled in a quality deer management (QDM) cooperative near King Ferry, New York in 2001, based on a 2002 mail survey of participating landowners.....	15
2	Deer-hunting participation by season and location for persons who hunted deer in 2001 in a quality deer management (QDM) cooperative near King Ferry, New York, based on a 2002 mail survey	17
3	Deer harvest by location for persons who hunted deer in 2001 in a quality deer management (QDM) cooperative near King Ferry, New York, based on a 2002 mail survey.....	18
4	Level of importance of concern associated with potential positive and negative deer-related impacts by landowners participating in a Quality Deer Management (QDM) cooperative near King Ferry, NY, based on a 2002 mail survey of participating landowners.....	20
5	Desired management outcomes listed at an initial meeting on 19 September 2001 by 42 deer hunters interested in participating in a Quality Deer Management cooperative near King Ferry, New York.....	21
6	Initial mean-ends matrix pertaining to management outcomes (i.e., ends) sought by hunters participating in a quality deer management (QDM) cooperative near King Ferry, New York, based on group discussions with participating hunters	25
7	Level of importance associated with potential, positive deer-related impacts by hunters participating in a Quality Deer Management (QDM) cooperative near King Ferry, New York, based on a 2002 mail survey.....	29
8	Level of concern associated with potential deer-related impacts by hunters participating in a Quality Deer Management (QDM) cooperative near King Ferry, New York, based on a 2002 mail survey.....	30
9	Relationship between reasons for participating in Quality Deer Management (QDM) and potential impacts rated as “very important” or about which they were “very concerned,” for hunters in a QDM cooperative near King Ferry, New York in 2002.....	31

LIST OF TABLES (cont.)

Table No.	Title	Page
10	Comparison of mean current levels and mean objective levels for eight possible deer-related impacts, perceived by landowners participating in a quality deer management (QDM) cooperative near King Ferry, New York, based on a mail survey in 2002. Levels based on a scale from 0 to 10.....	39
11	Comparison of mean current levels and objective levels for eight possible deer-related impacts, perceived by deer hunters who greatly valued each particular impact (high-importance group) and deer hunters who placed less importance on each (low-importance group), determined through a mail survey of hunters participating in a quality deer management (QDM) cooperative near King Ferry, New York in 2002. Levels based on a scale from 0 to 10	41
12	Comparison of deer sex ratio and buck age structure estimated by hunters who greatly value naturalness of the sex ratio and buck age structure as outcomes to be achieved through management (high-importance groups) and hunters who place less importance on naturalness (low-importance group), from a mail survey of hunters participating in a quality deer management (QDM) cooperative near King Ferry, New York in 2002	58

LIST OF FIGURES

Figure No.	Title	Page
1	Deer hunters' initial conception of the deer management system reflecting their assumptions about how specific management actions will change hunter-deer interactions, and how those changes will achieve management objectives and increase hunter satisfaction, based on discussions with 42 hunters participating in a QDM cooperative near King Ferry, NY in 2002	26
2	First revision of hunters' conception of the deer management system, identifying 5 deer-related impacts (far right) that they associated with particular hunter-deer interactions and changes in specific deer population characteristics, based on discussions with 42 hunters participating in a QDM cooperative near King Ferry, NY in 2002	27
3	Percent of respondents assuming (a) a natural buck age structure and (b) a natural deer sex ratio are more likely under quality deer management (QDM) vs. conventional deer management (CDM), comparing hunters for whom level of naturalness is "very important" (high-importance group) with hunters who place less importance on naturalness as a management outcome (low-importance group)	34
4	Percent of respondents assuming (a) hunters being fair to each other and (b) personal urgency to take the first buck they see will be more likely under quality deer management (QDM) vs. conventional deer management (CDM), comparing hunters for whom levels of fairness and urgency are important enough to be managed (high-importance group) with hunters who place less importance on these management outcomes (low-importance group).....	35
5	Percent of respondents assuming that level of fear about being shot by other hunters shooting indiscriminately at deer will be more likely under quality deer management (QDM) vs. conventional deer management (CDM), comparing hunters for whom this fear is an outcome about which they are "very concerned" (high-importance group) with hunters who are less concerned about this management outcome (low-importance group).....	36

LIST OF FIGURES (cont.)

Figure No.	Title	Page
6	Percent of respondents assuming that self-perception as (a) a better-than-average hunter and (b) a venison provider will be more likely under quality deer management (QDM) vs. conventional deer management (CDM), comparing hunters for whom these self-perceptions are “very important” (high-importance group) with hunters who place less importance on these management outcomes (low-importance group)	37
7	Percent of respondents assuming (a) healthier individual deer and (b) greater tree diversity will be more likely under quality deer management (QDM) vs. conventional deer management (CDM), comparing hunters who indicated these outcomes were “very important” (high-importance group) with hunters who place less importance on these outcomes (low-importance group).....	38
8	Simultaneous comparison of deer hunters’ assumptions about whether staying with conventional deer management (CDM) or switching to quality deer management (QDM) will be more beneficial in terms of achieving nine potential outcomes of deer management, for hunters who highly value each outcome.....	44
9	Simultaneous comparison of deer hunters’ assumptions about whether staying with conventional deer management (CD) or switching to quality deer management (QDM) will be more beneficial in terms of achieving nine potential outcomes of management, for hunters who placed relatively low importance on each outcome.....	46
10	Model of factors affecting level of fairness among hunters (i.e., that all hunters are “playing by the same fair rules”), as described by a small group of hunters participating in a Quality Deer Management (QDM) cooperative near King Ferry, New York in 2002	50
11	Relationship between the perceived percentage of hunters not complying with a quality deer management (QDM) regulation to pass-up shots at smaller antlerless bucks and hunters’ level of disappointment about lack of fairness shown by other hunters, from a mail survey of hunters participating in a QDM cooperative near King Ferry, New York in 2002	52

LIST OF FIGURES (cont.)

Figure No.	Title	Page
12	Relationship between the perceived percentage of hunters not complying with a quality deer management (QDM) regulation to pass-up shots at smaller antlered bucks and hunters' sense of urgency to shoot the next buck they see, from a mail survey of hunters participating in a QDM cooperative near King Ferry, New York in 2002	53
13	Model of factors affecting deer hunters' self-perceptions as better-than-average hunters, as described by a small group of hunters participating in a Quality Deer Management (QDM) cooperative near King Ferry, New York in 2002	55
14	Model of factors affecting hunters' perceptions of the naturalness of the deer population, as described by a small group of hunters participating in a Quality Deer Management (QDM) cooperative near King Ferry, New York in 2002.....	57
15	Naturalness of the deer population associated with (top) various deer sex ratios, and (bottom) various buck age structures by deer hunters for whom naturalness is "very important" (high-importance group) and hunters who place less importance on naturalness (low-importance group), from a mail survey of hunters participating in a quality deer management cooperative near King Ferry, New York in 2002	59
16	An example of a revised management means-end matrix for three deer-related impacts of importance to hunters participating in a quality deer management (QDM) cooperative near King Ferry, New York	61

**Landowner and hunter response to implementation of a
Quality Deer Management (QDM) cooperative near King Ferry, New York**

EXECUTIVE SUMMARY

In 2001, staff with the New York State Department of Environmental Conservation, Bureau of Wildlife (BOW) started working with 36 private landowners and many hunters who typically hunted on those properties to establish a 12,000ac QDM cooperative near King Ferry, NY. BOW staff sought assistance from Cornell University's Human Dimensions Research Unit (HDRU) to evaluate the cooperative. The purpose of this study was to collect baseline behavioral and attitudinal data as a first step in a long-term evaluation of QDM as a harvest strategy to balance positive and negative deer-related impacts from the perspectives of landowners and deer hunters.

METHODS

Our preliminary evaluation efforts involved small group discussions followed by a mail survey. We used a meeting with a large group of hunters and landowners (n = 42) to identify major management outcomes desired from their participation in the QDM cooperative. Then we used a series of small group meetings with hunters (n = 2 to 8) and landowners (n = 5) to better understand the fundamental ends, or deer-related impacts, that participants associated with these management outcomes. Finally, implemented a mail survey to (a) verify specific deer-related impacts (both positive and negative) on which to focus management efforts, (b) calibrate relationships in the system of factors affecting levels of those impacts, and (c) determine current levels and desired/acceptable levels of impacts (i.e., fundamental objectives of QDM).

RESULTS

Group discussions revealed that hunters and landowners shared a “mental model” of deer management based on the general premise that deer population characteristics (e.g., total numbers of deer, and age and sex composition) affect the kinds of deer-related interactions that hunters and landowners experience. Hunters focused on maximizing certain kinds of interactions like observing and harvesting mature bucks, but they also desired fairness and safety in their interactions with each other. Landowners tended to focus on minimizing other kinds of interactions with deer including crop damage, over browsing in woodlots, and deer-vehicle accidents.

The mail survey verified that hunters and landowners wanted to participate in QDM to change the characteristics of the deer population which, in turn, would lead to more positive deer-related interactions, and fewer negative interactions. In essence, deer management objectives of importance to hunters and landowners had not been realized under conventional deer management. They believed that alternative management actions (i.e., QDM) were needed to change the outcomes of the system of interactions possible with existing deer population characteristics that are produced through conventional deer management (CDM). Thus starting in 1991, they adopted voluntary buck harvest standards (i.e., passing-up shots at younger bucks) and emphasized harvest of antlerless deer.

Further, small group discussions revealed that hunters and landowners wanted changes in deer population characteristics because they believed those changes were potential *means* to more *fundamental ends*. The set of fundamental ends valued highly by participants can be thought of as *deer-related impacts* to be managed through QDM. The survey verified that many hunters greatly valued these positive impacts: (1) friendships with landowners, (2) healthy individual deer, (3) fairness among hunters, and (4) naturalness in the deer population. A majority of hunters also was very concerned about the fear of being shot by other hunters indiscriminately shooting at deer. For landowners, the survey found that many landowners were very concerned about these negative impacts: (1) frustration about the persistent risk of crop damage, (2) risk of injury from a deer-vehicle accident, and (3) risk of excessive cost from a deer-vehicle accident.

Small group discussions revealed that they assumed desired or acceptable levels of impacts “automatically” would be achieved if the desired changes occurred in the deer population characteristics under QDM. These assumptions generally were verified through the mail surveys of hunters and landowners. However, we found some differences in assumptions between those who greatly valued particular impacts (high importance groups) compared to those who placed less importance on those impacts (low importance groups). In particular, those in the low importance groups tended to over-estimate the benefit of switching to QDM from CDM. We also found higher levels of uncertainty and/or disagreement among respondents in the high importance groups about whether various impacts would be more likely under QDM vs. CDM.

Further, we found areas of disagreement between high importance and low importance groups with respect to current levels of impacts and desired/acceptable (i.e., objective) levels. Respondents in the high importance groups indicated that current levels of positive impacts fell short of objective levels they desired, and current levels of negative impacts exceeded acceptable levels. Although respondents in the low importance groups thought current levels of positive impacts were below desired levels, they generally underestimated the objective levels desired by those in the high importance groups. In addition, those in low importance groups generally thought that current levels of negative impacts were below maximum acceptable levels.

CONCLUSIONS

Hunters’ satisfaction with QDM and willingness to continue with the cooperative were high after one hunting season. However, their assumptions about the likely benefits of QDM generally do not reflect well the fundamental ends that they seek from deer management (i.e., the deer-related impacts to be managed) or the system of factors that influence levels of those ends. Thus, not surprisingly, current levels of positive impacts generally are below desired levels and current levels of negative impacts generally exceed tolerable levels. Therefore, opportunities for several kinds of social learning need to be made available to participants prior to collaborative decision making about any alternative management actions to be implemented under QDM.

First, a better understanding is needed about which impacts to focus on as fundamental objectives of QDM. Second, greater understanding is needed about the systems of factors affecting the various impacts. In particular, learning is needed about which factors may affect multiple impacts, and about the magnitude or nature of the effect of a given factor on an impact.

Third, better understanding is needed about why respondents in the low-importance groups consistently underestimated current levels of impacts compared to respondents in the high-importance groups. Fourth, appropriate objective levels for impacts to be managed need to be determined, given possible trade-offs about what levels can realistically be achieved at the same time. Finally, a revised conception of the deer management system likely will provide a necessary foundation for the identification of alternative management actions to implement as part of QDM.

INTRODUCTION

The concept of Quality Deer Management (QDM) is becoming popular among hunters across the U.S. (Alsheimer 2003). Basic premises of QDM are to reduce harvest of young bucks to increase the number of older, more mature bucks with larger antlers, to increase harvest of adult female deer to create a more balanced deer sex ratio, and to decrease the total deer population if it is not in balance with available habitat (Woods et al. 1996). In 2001, staff with the New York State Department of Environmental Conservation, Bureau of Wildlife (BOW) approached a group of private landowners and associated hunters near King Ferry, NY about the possibility of establishing a QDM cooperative on private lands in the area. By the fall hunting season, 36 private landowners about 80 hunters who typically hunted on those properties agreed to establish a QDM cooperative on about 12,000ac. The number of participating landowners and associated hunters is much larger than single-owner or public land QDM sites in other areas.

BOW staff sought assistance from Cornell University's Human Dimensions Research Unit (HDRU) to evaluate the cooperative. The purpose of this study was to collect baseline behavioral and attitudinal data as a first step in a long-term evaluation of QDM as a harvest strategy to balance positive and negative deer-related impacts from the perspectives of landowners and deer hunters.

Research Objectives

- (1) Determine factors influencing landowners' and deer hunters' decisions to participate in a QDM cooperative.
- (2) Ascertain participating landowners' current access-related behaviors and attitudes towards deer-related impacts on their lands and towards management of those impacts.
- (3) Ascertain participating hunters' current hunting-related behaviors and attitudes, focusing on factors affecting hunter satisfaction and sex-specific characteristics of

the deer population and harvest.

- (4) Determine landowners' and hunters' satisfaction with QDM as implemented, and their willingness to continue participating in the cooperative.
- (5) Determine changes in participating landowners' and hunters' behaviors or attitudes resulting from QDM.
- (6) Determine the degree to which participating landowners and hunters attribute measurable changes in deer-related impacts to implementation of QDM.

This initial phase of the evaluation focuses on objectives 1-4 above to ascertain baseline information that can be used to assess at a later date objectives 5 and 6.

Organization Of Report

In the next section, we provide a brief overview of the methods used in this phase of the evaluation. We present study findings in subsequent sections for hunters and landowners. Findings are organized as a series of questions and answers, rather than descriptions of data pertaining to each of the study objectives. In most cases, a particular question relates to more than one study objective. We believe this format will be more useful for communicating insights and building understanding among the participants involved in the QDM cooperative.

METHODS

Meetings With Hunters And Landowners

BOW and HDRU staff invited all participating landowners and hunters to meet separately to better understand what they wanted from QDM and reasons why specific changes

in deer population characteristics were so important to them. The hunter meeting was held on 19 September 2001, and was attended by 42 hunters. We built upon the insights gained at the meeting with hunters by meeting with a small group of volunteers five more times between February and May 2002. At those subsequent meetings, we developed a better understanding of how hunters think about deer management and the kinds of outcomes that might be managed through QDM. The landowner meeting was held on 15 June 2002. Because this meeting attracted only 5 people, we did not have any follow-up meetings with landowners.

Based on information gleaned from the meetings, HDRU developed and mailed separate questionnaires to all landowners and hunters in October 2002. We used these surveys to validate some of the insights gained in the group discussions, collect base-line data on participants' perceptions of deer population characteristics, satisfaction with QDM and willingness to continue with the QDM cooperative, and determine some of the levels of deer-related impacts that hunters and landowners thought they needed to experience before they would say that QDM was a success.

RESULTS

What are the characteristics of landowners participating in the QDM cooperative?

About one-half of landowners participating in the cooperative (52.7%) responded to the survey. They averaged 52 years of age, and owned (or managed) their properties for an average of 22 years. They categorized their properties as either farms (58%) or rural, non-farm land (42%). Properties averaged about 264 acres (range = 8 to 1,100). Dominant land uses included cash crops (\bar{x} = 106 acres), woodlots (\bar{x} = 81 acres), and hay (\bar{x} = 52 acres). Other uses included pasture (\bar{x} = 13 acres), specialty crops (\bar{x} = 5 acres), and barnyards and buildings (\bar{x} = 4 acres).

Two-thirds (68%) of responding landowners had at least some college education and 21% had a post-graduate degree. A plurality (40%) reported household income of \$25,000 to \$49,999. Fewer reported household incomes ranging from \$50,000 to \$74,999 (13%), \$75,000 to \$100,000 (27%), and >\$100,000 (20%).

Most landowners (83%) specifically inform hunters that their property is enrolled in QDM, or have participating hunters inform new hunters who seek access (6%), but 11% of landowners indicated they did not know how hunters found out their properties were enrolled in QDM. Landowners reported no difference in the number of hunters they allowed to hunt on their properties prior to QDM ($\bar{x} = 12$) or since the cooperative was initiated ($\bar{x} = 11$). Only one landowner changed his access policy since QDM was implemented (Table 1). That owner no longer provided access for family members, and no longer allowed open access without permission.

Table 1. Persons allowed to hunt on private properties before and after the properties were enrolled in a quality deer management (QDM) cooperative near King Ferry, New York in 2001, based on a 2002 mail survey of participating landowners.

Had permission to hunt property before QDM			Has had permission to hunt property since QDM		
	n	%		n	%
No one	19	0	No one	19	0
Family	19	26	Family	19	21
Friends and neighbors	19	89	Friends and neighbors	19	89
Strangers who asked	19	5	Strangers who asked	19	5
Anyone without asking	19	16	Anyone without asking	19	10

Although about one-half of responding landowners did not know how many deer typically were harvested on their properties, those who kept records indicated different harvests before QDM compared to after QDM was implemented. Since QDM was implemented, more antlerless deer QDM ($\bar{x} = 2.9$) and fewer small bucks ($\bar{x} = 0.5$) were harvested, compared to under conventional deer management ($\bar{x} = 1.8$ for antlerless deer and $\bar{x} = 4.7$ for small bucks). On average, very few mature bucks were harvested either before QDM (0.8) or since ($\bar{x} = 1.2$).

What are the characteristics of hunters participating in the QDM cooperative?

All responding hunters were male. Most resided in a rural, non-farm area (72%) or in a small city (19%). While respondents generally had achieved a high level of formal education (64% had at least some college education), they reported a wide range of household incomes. Similar percentages reported household incomes between \$25,000 and \$49,999 (28%), between \$50,000 and \$74,999 (23%), and between \$75,000 and \$100,000 (28%).

Respondents averaged 49 years of age (range 20-80), had hunted deer for an average of 30 years, and had hunted deer in the King Ferry area for about 17 years. Overall, they had taken an average of about 16 antlered bucks and 15 antlerless deer in their lives. A slight majority (56%) indicated that the King Ferry QDM area was their primary hunting location.

Most respondents hunted deer during the regular firearm season, less than one-half during the early archery season, and only a few during the late archery or muzzleloader seasons (Table 2). Within each season, similar percentages hunted on the QDM area as hunted elsewhere. That is, if they bowhunted, they tended to hunt both on the QDM area and elsewhere. If they hunted during the regular season, they did so both on the area and elsewhere. Further, they hunted similar numbers of days regardless of where they hunted.

Table 2. Deer-hunting participation by season and location for persons who hunted deer in 2001 in a quality deer management (QDM) cooperative near King Ferry, New York, based on a 2002 mail survey.

<u>Location hunted</u>	<u>Hunting season</u>	<u>Percent participating</u>	<u>Days hunted</u>
King Ferry QDM	Early archery	40.9	10.0
	Regular firearm	75.9	8.0
	Late seasons	18.2	3.5
Elsewhere	Early archery	47.7	12.4
	Regular firearm	72.7	8.1
	Late seasons	15.9	3.0

Consistent with our expectations given the buck harvest standards implemented on the QDM area for the first time in 2001, more respondents harvested bucks elsewhere than on the QDM area during the 2001 hunting season (Table 3). Conversely, more respondents harvested ≥ 1 antlerless deer on the QDM area. This latter finding supports the notion that hunters tried to fill antlerless permits on the area rather than elsewhere. Overall, respondents had high rates of success in taking both antlerless deer (63% harvested at least 1 antlerless deer with one-half of those taking 2) and antlered bucks (45% harvested 1 buck, and 7% harvested 2).

Table 3. Deer harvest by location for persons who hunted deer in 2001 in a quality deer management (QDM) cooperative near King Ferry, New York, based on a 2002 mail survey.

<u>Location hunted</u>	<u>Number antlerless deer harvested</u>	<u>Percent of hunters taking this number</u>	<u>Number antlered bucks harvested</u>	<u>Percent of hunters taking this number</u>
King Ferry	0	59.1	0	86.0
	1	31.8	1	11.6
	2	9.1	2	2.3
Elsewhere	0	65.1	0	61.4
	1	23.3	1	34.1
	2	11.6	2	4.5

What do landowners want from QDM?

Five landowners met with HDRU and DEC staff in June 2002 to discuss their perceptions of the deer management system; all five were hunters. Their discussion focused on hunting-related outcomes although deer damage to crops and forest tree diversity, and concerns about deer-vehicle accidents also were mentioned. Respondents to the landowner mail survey reported that their interest for participating in the QDM cooperative was based on a desire for fewer negative effects from landowner-deer interactions and deer-habitat interactions. Most landowners wanted to see fewer deer on their property (61%) or experience less crop damage (56%). Many wanted fewer hunters shooting indiscriminately at bucks (50%), fewer deer-vehicle accidents (44%), or better tree regeneration in woodlots (33%).

Desires for more positive deer-related interactions were indicated by a minority of landowners. A few (22%) wanted to participate in QDM solely because their hunter friends wanted to try it, and one landowner indicated a willingness to participate because neighboring

landowners wanted to participate. Two landowners wanted healthier deer and one wanted a better chance to harvest a mature buck.

In the group discussion, we identified some potential positive and negative impacts that landowners associated with changes in deer-related interactions (either with deer directly or with deer hunters; see Appendix A). Although these might be considered fundamental objectives of deer management for at least some survey respondents, none of the potential impacts we listed were verified as impacts to be managed by a majority of respondents to the landowner survey (Table 4).

What do hunters want from QDM?

Our understanding of hunters' interests and desires is much richer than for landowners because we met with more hunters, more often. At the initial group meeting with hunters, the 42 participants listed 27 management outcomes desired from QDM (Table 5). These generally pertained to interactions hunters have with deer (especially bucks), each other (in terms of fairness), and landowners (in terms of access issues and setting rules for implementing QDM). Highest priority outcomes focused on changing hunters' interactions with deer (e.g., seeing and harvesting a larger number of mature antlered bucks, seeing a larger proportion of antlered bucks). These priorities are consistent with those purported by pro-QDM literature to be possible (e.g. Alsheimer 2003), and those reported as desired by hunters in other places where hunter-interest in QDM has been studied (e.g., Woods et al. 1996).

Table 4. Level of importance or concern associated with potential positive and negative deer-related impacts by landowners participating in a Quality Deer Management (CDM) cooperative near King Ferry, NY, based on a 2002 mail survey of participating landowners.

Percent indicating each potential impact was...				
Potential positive impacts	n	Very important	Not at all to moderately important	Unsure about level of importance
Getting 'top dollar' for hunting lease	18	0.0	94.4	5.6
Less frustration about crop damage	18	38.9	50.0	11.1
Stay friends with other landowners	18	22.2	72.2	5.6
Having enough venison to eat, share	18	5.6	83.3	11.1
Property as good deer habitat	18	27.8	72.2	0.0
Stay friends with hunters using land	18	11.1	78.9	0.0
Less income lost from crop damage	18	38.9	55.6	5.6
Being an "expert deer hunter"	18	0.0	94.4	5.6
Percent indicating they were...				
Potential negative impacts	n	Very concerned	Not at all to moderately concerned	Unsure about level of concern
Lost income from crop damage	18	27.8	72.2	0.0
Fear of being shot by hunters	18	27.8	72.2	0.0
Frustration about crop damage	18	38.9	61.1	0.0
Losing friendships with landowners	18	5.6	94.4	0.0
Having less tree diversity in woods	18	16.7	83.3	0.0
Fear of getting Lyme disease	18	16.7	83.3	0.0
Losing friendships with hunters	18	11.1	88.9	0.0
Being hurt in deer-vehicle accident	18	33.3	67.7	0.0
Fear eating deer sick with CWD	18	22.2	72.2	5.6
Paying for car repairs if hit a deer	18	33.3	67.7	0.0

Table 5. Desired management outcomes listed at an initial meeting on 19 September 2001 by 42 deer hunters interested in participating in a Quality Deer Management cooperative near King Ferry, New York.

<u>Desired management outcomes</u>	Number of votes received indicating each as...		
	<u>1st priority</u>	<u>2nd priority</u>	<u>3rd priority</u>
<i>Seeing and harvesting bucks</i>			
Increase sightings and harvest of mature antlered bucks	16	6	2
More balanced age structure among bucks (more older bucks)	5	4	2
Increase harvest of “big does” to avoid taking button bucks	1	2	3
Maintain opportunities to harvest <u>a</u> buck	1	--	--
Increase opportunities to harvest <u>a</u> buck	2	--	--
Increase sightings of younger bucks	--	2	--
Increase opportunities to hunt bucks during the prime rut	--	--	--
<i>Changing the deer sex ratio</i>			
More equal buck/doe ratio	5	7	4
<i>Managing total numbers of deer</i>			
Decrease total numbers of deer	2	--	1
Maintain total numbers of deer	--	5	1
Increase total numbers of deer	--	--	--
<i>Managing the quality and health of individual deer</i>			
Increase quality and health of all deer	2	--	2
Decrease predation on deer	1	--	3

Table 5 (continued)

Decrease sightings of archery-wounded deer in prior to firearms season	--	--	1
Decrease sighting of wounded deer during the firearms season	--	--	--
Increase opportunities to track wounded deer across property boundaries	--	--	--
<i>Rules about implementing QDM</i>			
All hunters should play by the same fair rules	2	6	5
Have consistent rules and opportunities for all hunting seasons (bow, muzzle, gun)	2	1	3
Have opportunities for exceptions to rules	1	--	1
Increase power of hunters and landowners to make decisions re QDM implementation	1	--	--
Increase power of landowners to control how many deer are taken from their properties	--	2	1
Decrease spotlighting during the season	--	--	1
<i>Access issues</i>			
Decrease hunters crossing over property lines	2	1	1
Increase access for all hunters to properties previously not open to hunting	1	--	--
Increase information about who is hunting and when on a given property	--	2	--
Increase honesty between hunters and landowners	--	1	1
Increase opportunities for hunters to contact landowners who want more deer harvested from their properties	--	--	--

Noticeably lacking from Table 5 is mention of changes in interactions between deer and their habitat. Only two of the 27 desired outcomes listed (decreasing total deer numbers, and linking hunters with landowners who want more deer harvested) are related to deer-landowner interactions. QDM literature tends to emphasize enhancement of habitat quality (e.g., Woods et al. 1996, Alsheimer 2003), but habitat quality generally is high in the agricultural landscape encompassing the King Ferry QDM cooperative.

What do hunters assume about the deer management system that leads them to believe that certain outcomes will happen if QDM is implemented?

Discussions with hunters attending the September 2001 meeting revealed that they have a “mental model” of how deer management works (Figure 1). Their basic premise is that deer population characteristics (e.g., total numbers of deer, and age and sex composition) affect the kinds of deer that hunters see and harvest (i.e., hunter-deer interactions). Management outcomes that hunters generally desired (i.e., objectives of management) are changes in specific deer population characteristics (i.e., sex ratio and age structure). Hunters believed that changing these characteristics will increase desirable hunter-deer interactions, especially relating to mature, antlered bucks.

Hunters who agreed to participate in QDM believe that some desired outcomes (i.e., management objectives) have not been achieved through the conventional hunting regulations (i.e., management actions) used in New York’s Southern Zone for deer management. Their interest in participating in QDM is based on the belief that achievement of desired objectives related to deer population characteristics will require implementing some *alternative management actions*. Thus, in 2001 participating hunters and landowners adopted a voluntary

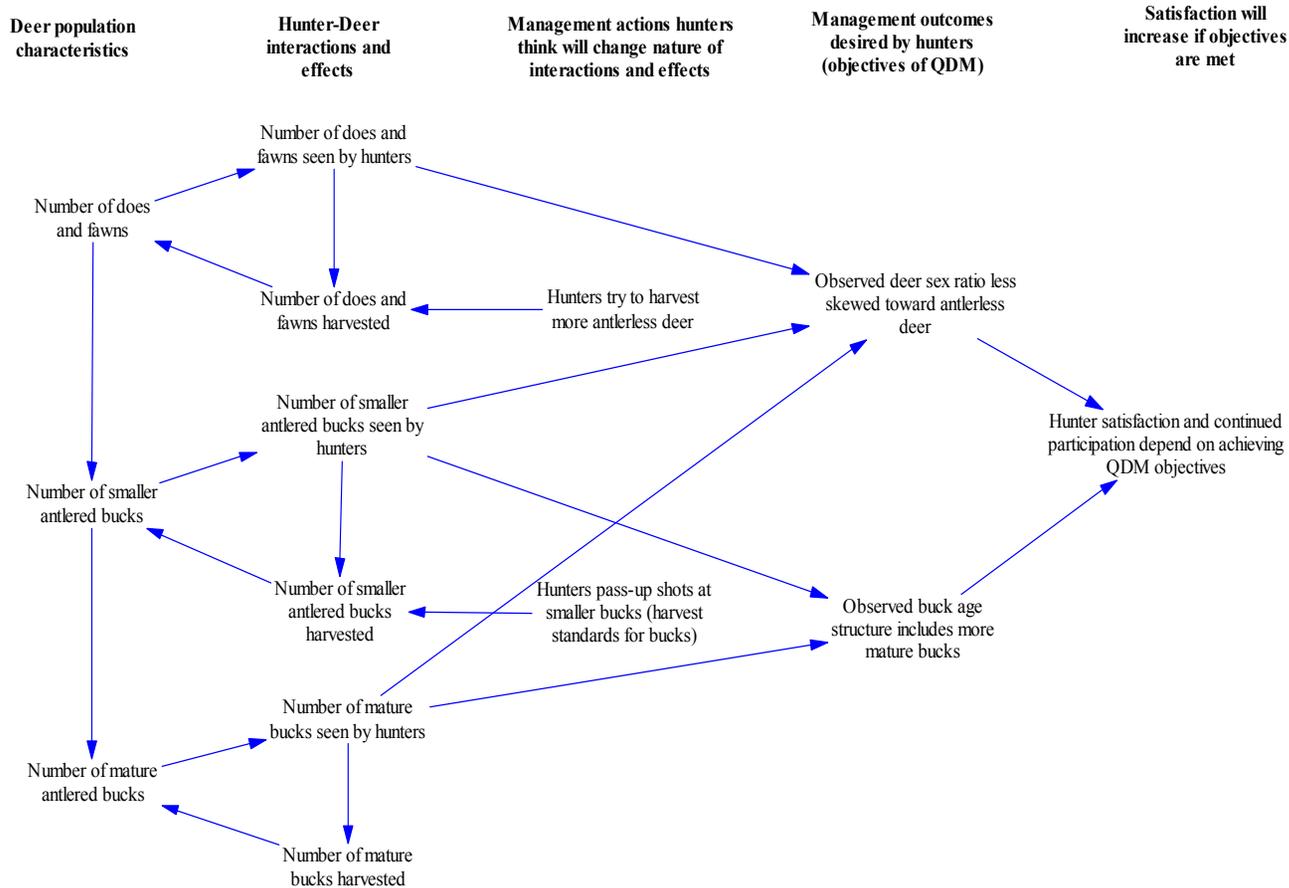
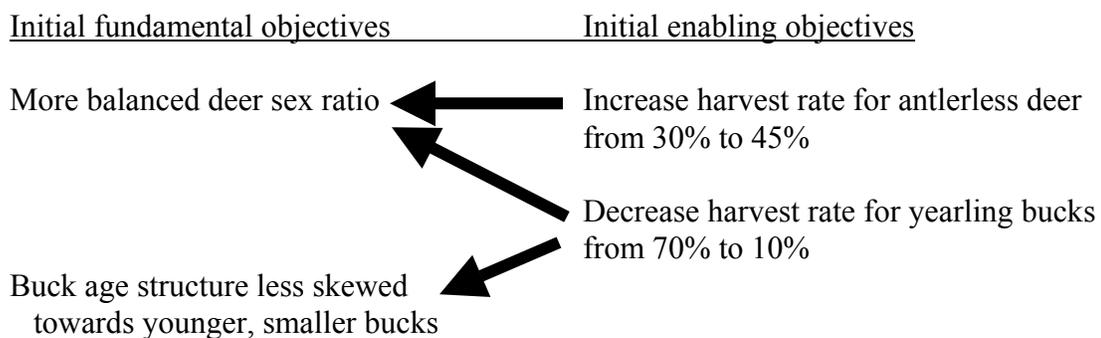


Figure 1. Deer hunters' initial conception of the deer management system reflecting their assumptions about how specific management actions will change hunter-deer interactions, and how those changes will achieve management objectives and increase hunter satisfaction, based on discussions with 42 hunters participating in a QDM cooperative near King Ferry, NY in 2002.

buck harvest standard (i.e., passing-up shots at younger bucks) and many pledged to personally increase their harvest of antlerless deer.

The arrows in Figure 1 show how hunters generally think about connections between deer population characteristics (particularly numbers of deer by age and sex), hunter-deer interactions, and management actions directed toward changing the nature of those interactions. Thus, Figure 1 represents hunters' conceptual model of the deer management system. Hunters expected that adoption of QDM harvest standards will change the outcomes of that system, compared to outcomes that would occur under conventional deer management (CDM). Based on this initial conception of the deer management system, we better understood why hunters believed attainment of desired management outcomes, or "fundamental objectives" were possible only by meeting certain "enabling objectives" focused on deer and related to harvest (Table 6).

Table 6. Initial means-ends matrix pertaining to management outcomes (i.e., ends) sought by hunters participating in a quality deer management (QDM) cooperative near King Ferry, New York, based on group discussions with participating hunters.



What *fundamental ends* do hunters associate with desired management outcomes?

At initial small group meetings in February 2002, hunters discussed why they desired certain outcomes listed at the September meeting. The discussion revealed that desired changes in deer population characteristics and related changes in hunter-deer interactions were not really *ends* in and of themselves, but were *means* to more *fundamental ends* that hunters sought. These included: (1) healthy deer, (2) natural deer population, (3) hunters being fair to each other, (4) sufficient venison for eating and sharing, and (5) demonstrating that they are better-than-average hunters. Riley et al. (2002) referred to these fundamental ends valued by hunters as *deer-related impacts* to be managed. If they wanted, participants could agree to establish a fundamental objective for each impact, perhaps based on minimum desired levels hunters would need to perceive or experience before they would say QDM management actions have been successful.

Our discussions revealed that hunters assumed these impacts “automatically” would be achieved if desired changes occurred in deer population characteristics (Figure 2). That is, if QDM harvest standards led to changes in the kinds of hunter-deer and hunter-hunter interactions produced by the deer management system, then desired levels of impacts also should be achieved. Arrows in Figure 2 show impacts that hunters associated with specific kinds of interactions. This reflects hunters’ first description of fundamental objectives for QDM and the means necessary to achieve them. (See Appendix A for a depiction of how landowners think about the deer management system and the attainment of fundamental objectives for QDM.)

Discussions further revealed that hunters were concerned about some negative, deer-related impacts. They described how they wanted management to reduce (or maintain at low levels) “...some of the bad things related to deer or other hunters.” These included: (1) fear of being shot by other hunters shooting indiscriminately at deer, (2) fear of being injured in a deer-

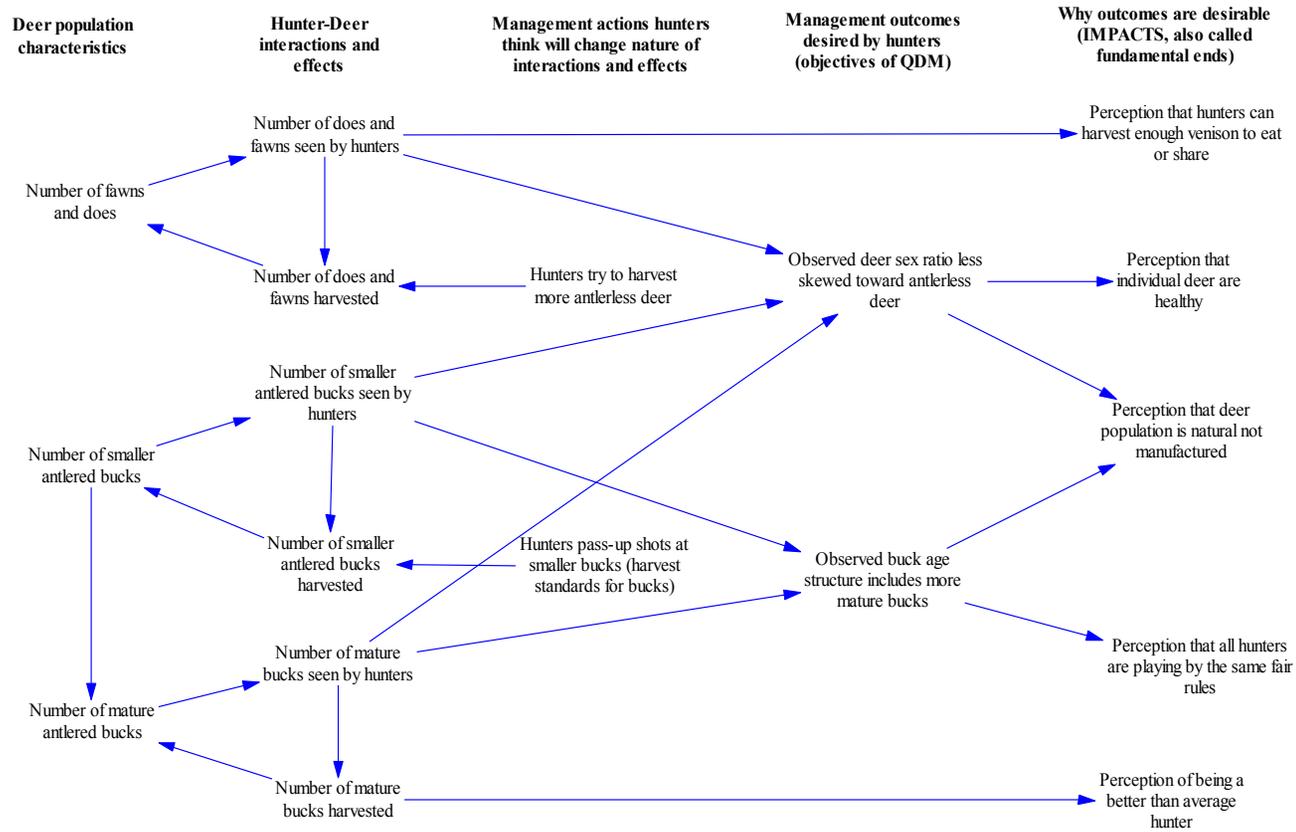


Figure 2. First revision of hunters' conception of the deer management system, identifying 5 deer-related impacts (far right) that they associated with particular hunter-deer interactions and changes in specific deer population characteristics, based on discussions with 42 hunters participating in a QDM cooperative near King Ferry, NY in 2002.

vehicle accident, (3) excessive cost of repairs after having a deer-vehicle accident, (4) lack of sufficient tree regeneration in woodlots from deer browsing, (5) losing friendships with landowners (and access to private land for hunting) because of issues with deer, and (6) getting sick or contracting a disease from deer. Although hunters in the small groups identified these potential negative impacts to be managed, they were more interested in discussing positive impacts to be achieved. Hence, they do not appear in Figure 2.

How well did the small groups reflect the thoughts of all hunters about the deer management system and impacts they want managed as fundamental ends of that system?

The mail survey supported the conception of the deer management system that emerged from the small group discussions. Respondents wanted to participate in QDM based on several desired changes in hunter-deer interactions. Most respondents wanted to see a greater number of mature bucks (78%) and still be able to “shoot enough deer to have all the venison I want” (53%). Many wanted to hunt where the deer sex ratio is nearly balanced (44%), where others do not shoot small bucks (44%), and where they feel they can pass up shots at small bucks (40%).

Survey respondents also verified some of the positive and negative impacts identified in the small group discussions. Health of individual deer, fairness among hunters, and a natural deer population each were “very important” to a majority of respondents (Table 7). Being a venison provider or a better-than-average hunter also were verified as impacts, but for a minority of respondents. Maintaining a friendship with the landowner was deemed “very important” by the largest percentage of survey respondents. This may have reflected recognition that continuation of the QDM cooperative depends on willingness of landowners to continue providing access for hunting.

Table 7. Level of importance associated with potential, positive deer-related impacts by hunters participating in a Quality Deer Management (QDM) cooperative near King Ferry, New York, based on a 2002 mail survey.

Potential positive impacts	n	Percent indicating each potential impact was...		
		Very important	Not at all to moderately important	Unsure about how important
Friendship with landowner	45	86.7	13.3	0.0
Healthiness of individual deer	46	76.1	23.9	0.0
Hunters being fair to each other	45	65.2	32.6	2.2
Natural buck age	46	58.7	41.3	0.0
Natural sex ratio	45	45.7	52.2	2.2
Being an “expert hunter” (i.e., better than average hunter)	45	37.0	60.9	2.2
Showing friends and family a big buck I harvested	46	32.6	67.4	0.0
Having enough venison to eat or share	46	28.3	71.7	0.0
Being a venison provider	46	19.6	76.1	4.3

Some of the negative impacts that were a concern to those in the small groups also were verified through the survey (Table 8). Two of these are negative versions of positive impacts (e.g., lack of fairness among hunters, losing friendships with landowners). Other negative impacts for substantial percentages of respondents pertained to risks to human safety and economic costs associated with deer.

Table 8. Level of concern associated with potential, negative deer-related impacts by hunters participating in a Quality Deer Management (QDM) cooperative near King Ferry, New York, based on a 2002 mail survey.

Potential negative impacts	n	Percent indicating each potential impact made them feel...		
		Very concerned	Not at all to moderately concerned	Unsure about how concerned they were
Lose friendship with landowner because of deer	42	64.3	35.7	0.0
Fear being shot by hunters shooting indiscriminately at deer	43	55.8	44.2	0.0
Fear eating deer that might be sick with Chronic Wasting Disease	42	42.9	54.8	2.4
Having to pay for car repairs after a deer-vehicle accident	42	42.9	57.1	0.0
Some hunters being unfair to others	42	37.2	60.5	2.3
Deer browsing decreasing diversity of tree species in woodlots	38	23.8	66.7	9.5
Fear getting Lyme disease	42	19.0	81.0	0.0
Being urgent to shoot the first antlered buck I see	41	9.8	90.2	0.0

We also found that respondents consistently valued certain impacts highly regardless of the reasons they wanted to participate in QDM (Table 9). For example, 88-100% of respondents who indicated they participated in QDM for any of the reasons listed in the questionnaire said that maintaining friendships with private landowners was “very important.” Similarly, healthy deer was “very important” to 71-85% of respondents, regardless of their reason for participating.

Table 9. Relationship between reasons for participating in Quality Deer Management (QDM) and potential impacts rated as “very important” or about which they were “very concerned”, for hunters in a QDM cooperative near King Ferry, New York in 2002.

	Reasons that hunters said they were willing to participate in a QDM cooperative													
	I want to see more mature bucks		I do not want to harvest small bucks		I still want to get enough venison		I want no one to take small bucks		To hunt where sex ratio is equal		The Landowner wants QDM		My hunting companions want QDM	
Potential positive impacts	35/45 = 78%		18/45 = 40%		24/45 = 53%		20/45 = 44%		20/45 = 44%		9 /45 = 20%		4/45 = 9%	
(n and % indicating a potential positive impact was “very important” to them personally)														
Have friendship with	30	88%	16	94%	22	92%	17	89%	19	95%	8	89%	4	100%
Be a deer provider	4	12%	3	19%	7	30%	3	17%	6	30%	4	44%	2	50%
Have healthy deer	29	83%	14	78%	17	71%	17	85%	15	75%	4	78%	2	75%
Be better than average hunter	13	38%	7	41%	8	33%	8	42%	5	25%	7	44%	3	25%
Have natural deer sex ratio	16	47%	9	50%	11	48%	10	50%	10	53%	4	63%	1	67%
Share venison	9	26%	6	33%	8	33%	6	30%	6	30%	3	33%	1	25%
Have fair hunters	23	68%	13	77%	16	70%	15	79%	13	68%	7	78%	4	100%
Tell family about big buck	12	34%	6	33%	7	29%	7	35%	6	30%	4	44%	2	50%
Have natural buck age	25	71%	16	89%	19	79%	17	85%	14	70%	3	33%	2	50%
structure														
Potential negative impacts	(n and % indicating they were “very concerned “ about each potential negative impact)													
Fear being shot	17	49%	9	50%	11	46%	10	50%	10	53%	6	67%	2	50%
Some unfair hunters	14	41%	9	53%	11	48%	11	58%	8	44%	4	44%	3	75%
Have poor tree diversity	9	28%	4	23%	5	22%	4	22%	4	21%	4	25%	1	25%
Feel urgency to shoot	3	9%	1	6%	3	13%	2	11%	2	10%	2	22%	1	25%
Get Lyme disease	6	18%	4	23%	7	30%	5	26%	5	26%	4	44%	3	75%
Lose landowner friendship	20	59%	11	65%	16	67%	12	63%	14	74%	8	89%	4	100%
Pay for car repairs	13	38%	5	29%	10	42%	5	26%	8	42%	4	44%	2	50%
Eat deer with CWD	13	39%	7	44%	10	42%	7	39%	7	37%	6	68%	3	75%

Substantial percentages of respondents also indicated they were “very concerned” about some of the negative impacts, particularly those related to risks to human health and safety. These findings support our contention that hunters participating in the QDM cooperative share the basic assumption that important impacts will be attained if certain *enabling objectives* are met, particularly those related to changes in deer population characteristics

Which impacts do landowners and hunters think are most likely to be achieved under QDM vs. conventional deer management (CDM)?

To assess landowners’ and hunters’ assumptions about whether particular impacts were more likely to be achieved under QDM vs. CDM, we separated respondents into two groups for each of nine possible impacts. A high-importance group of respondents reported the impact was “very important” or that they were “very concerned” about it. A low-importance group associated less importance or concern with that possible impact. Using this analysis, any respondent could be in high-importance groups for some possible impacts, but in the low-importance groups for others.

Because the number of landowners was much smaller than the number of hunters, we present the results differently. We describe in the paragraphs below the aggregate findings from all of the relatively few responding landowners, highlighting agreement, disagreement, and uncertainty in their assumptions. For the larger pool of responding hunters, we present a series of graphs that provide a visual comparison of opinions by those in the high importance and low importance groups.

Very little agreement existed among responding landowners about whether QDM would be more beneficial than CDM in either reducing negative impacts or increasing positive impacts. A plurality of landowners assumed that (1) risk of losing income from crop damage, (2) fear

about being shot by hunters, (3) risk of deer decreasing plant diversity in woodlots, and (4) poor health of individual deer would be more likely under CDM compared to QDM. That is, a plurality believed that QDM would be beneficial in terms of decreasing these negative deer-related impacts. However, much uncertainty existed among landowners about the benefits of QDM as relatively high percentages (e.g., 25%-40%) of responding landowners either were unsure about whether these negative impacts would be improved under either QDM or thought they were equally likely to occur under either QDM or CDM.

A plurality of landowners assumed that (1) not being frustrated about crop damage, (2) not worrying about the risk of being injured in a deer-vehicle accident, and (3) maintaining friendships with deer hunters on their properties all were equally likely under either QDM or CDM. That is, a plurality assumed no clear benefit under either approach although about a quarter of respondents disagreed and believed that QDM would be more beneficial for decreasing the risk of being injured in an accident and for maintaining friendships with hunters. Great uncertainty existed about whether losing friendships with neighboring landowners because of issues with deer was more likely under either QDM or CDM.

We found more agreement among responding hunters, at least for some of the deer-related impacts we examined. Most hunters in both high importance and low importance groups assumed that a natural buck age structure was more likely under QDM (Figure 3a). This was not surprising considering that the buck harvest standard adopted by participants as the only difference from CDM is intended to allow small bucks to become mature bucks. Hunters in the two groups disagreed, however, about whether a natural deer sex ratio was more likely under QDM or CDM (Figure 3b). Those in the high-importance group were split about which management approach would be most beneficial, and about one-quarter indicated they were

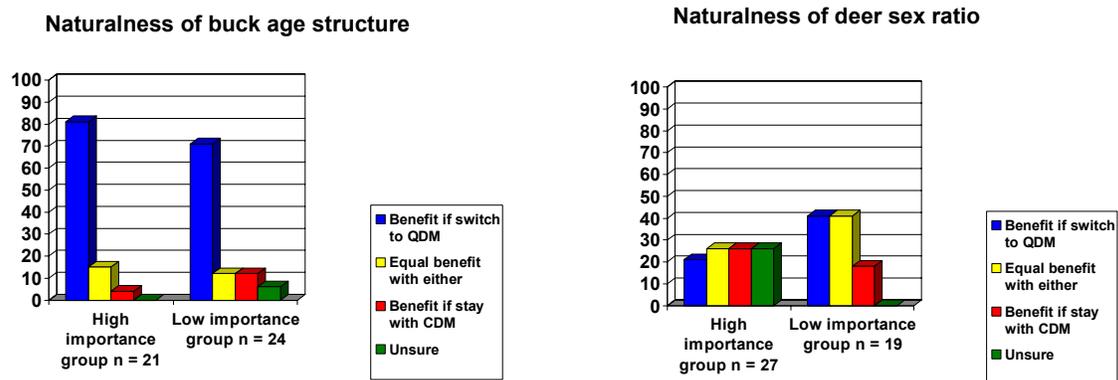


Figure 3 a, b. Percent of respondents assuming (a) a natural buck age structure and (b) a natural deer sex ratio are more likely under quality deer management (QDM) vs. conventional deer management (CDM), comparing hunters for whom level of naturalness is “very important” (high-importance group) with hunters who place less importance on naturalness as a management outcome (low-importance group).

unsure. Respondents in the low-importance group assumed a natural sex ratio was either more likely under QDM or equally likely under either approach, suggesting they assumed that a switch to QDM from CDM would not diminish naturalness of the sex ratio.

Many respondents in both groups assumed that hunters would be more likely to be *unfair* to each other under QDM compared to CDM (Figure 4a). That is, they assumed fairness would be higher under CDM. Small group discussions revealed that the notion of fairness has two parts (a) “equal gain,” and (b) “equal pain.” Under CDM, all hunters can shoot any antlered buck they see; thus, opportunity exists for equal gain, and there are no rules under CDM which “...cause equal pain.” Under QDM, buck antler restrictions require hunters to share equal pain (i.e., everyone must pass-up shots at small bucks). A hunter would be unfair to others if he “cheated” and harvested a small buck, thus not sharing in the “equal pain.”

Related to concern about “cheating” is hunters’ sense of urgency to shoot the first buck they see, as urgency increases as perceived cheating by others increases. Respondents in both

groups generally assumed that urgency would be minimized under QDM (Figure 4b), although one-half of hunters in the high-importance group assumed urgency would be equally likely under either management approach (i.e., at least urgency would be no higher under QDM than under CDM). Figures 4a and b suggest that hunters assume the QDM strategy of having hunters pass-up younger bucks will diminish their own urgency to take the first buck they see, but they also assume other hunters will “cheat” and thus be unfair to the larger group.

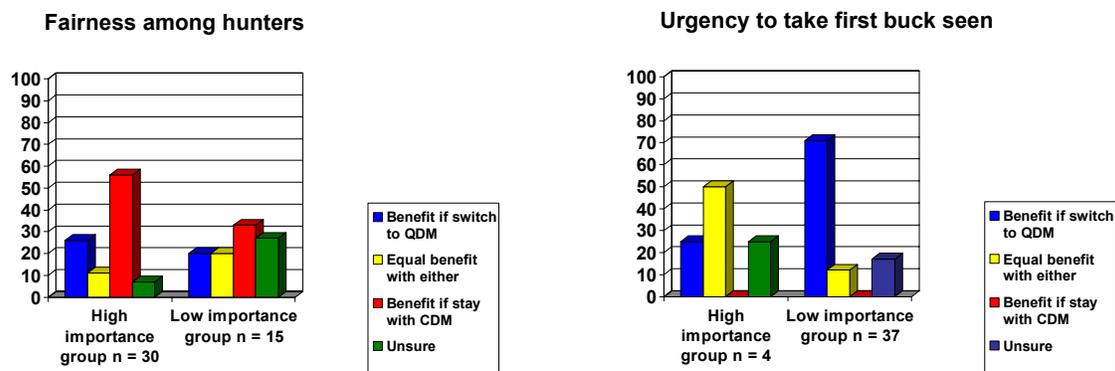


Figure 4 a, b. Percent of respondents assuming (a) hunters being fair to each other and (b) personal urgency to take the first buck they see will be more likely under quality deer management (QDM) vs. conventional deer management (CDM), comparing hunters for whom levels of fairness and urgency are important enough to be managed (high-importance group) with hunters who place less importance on these management outcomes (low-importance group).

A third outcome of the deer management system related to passing-up shots is hunters' fear about being shot by other hunters shooting indiscriminately at deer. A majority of respondents in the high-importance group assumed that this fear would be more likely under CDM, and thus their level of fear would be reduced under QDM (Figure 5). About one-half of respondents in the low-importance group assumed that fear about being shot was equally likely under either management approach (i.e., at least fear about being shot would not be any worse under QDM), and most of the remainder assumed that this fear would be higher under CDM.

Fear of being shot by indiscriminate shooters

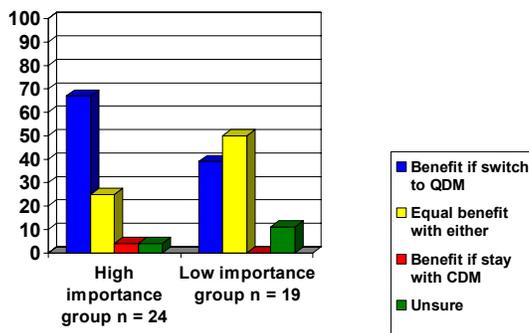


Figure 5. Percent of respondents assuming that level of fear about being shot by other hunters shooting indiscriminately at deer will be more likely under quality deer management (QDM) vs. conventional deer management (CDM), comparing hunters for whom this fear is an outcome about which they are “very concerned” (high-importance group) with hunters who are less concerned about this management outcome (low-importance group).

Most respondents who indicated that being a better-than-average hunter was “very important” assumed that this self-perception was more likely under QDM or was equally likely under either approach to management (Figure 6a). Respondents in the low-importance group for this self-perception were mixed with respect to their assumptions, perhaps reflecting their lack of understanding about the relationship between QDM outcomes and self-perception as a better-than-average hunter. Conversely, hunters who indicated that being a venison provider was “very important” had mixed assumptions about whether this self-perception was more likely under QDM or CDM (Figure 6b), in part because of uncertainty about future antlerless deer numbers given the lack of any adopted rules about harvest of antlerless deer. Respondents in the low-importance group for being a venison provider assumed this self-perception was more likely under CDM or was equally likely under either approach.

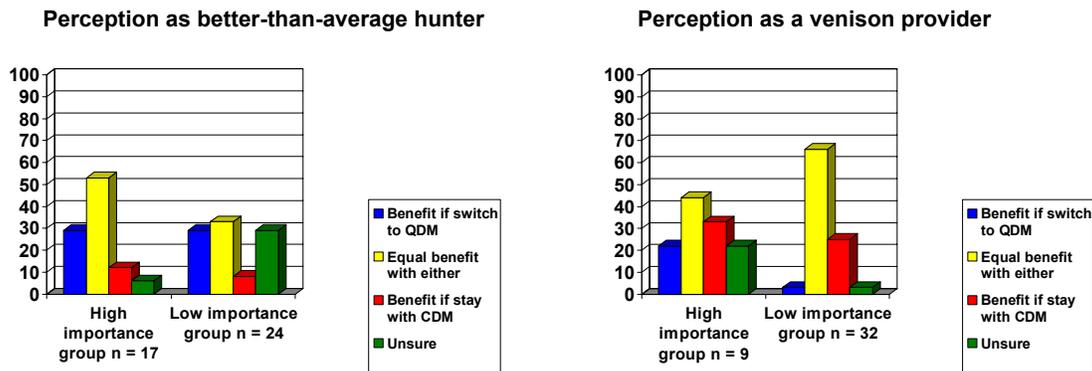


Figure 6 a, b. Percent of respondents assuming that self-perceptions as (a) a better-than-average hunter and (b) a venison provider will be more likely under quality deer management (QDM) vs. conventional deer management (CDM), comparing hunters for whom these self-perceptions are “very important” (high-importance group) with hunters who place less importance on these management outcomes (low-importance group).

Respondents in the high-importance groups for having healthy individual deer and sufficient diversity of tree species in woodlots had mixed assumptions about whether either of these ends was more likely under QDM compared to CDM (Figure 7a, b). However, many respondents in the low-importance group assumed deer would be healthier under QDM, but that tree diversity would be greater under CDM. This finding suggests that a substantial number of participating hunters did not link deer health to habitat quality (indexed by tree diversity). Also a substantial percentages of respondents indicated that they were unsure about whether either of these potential impacts was more likely under QDM or CDM.

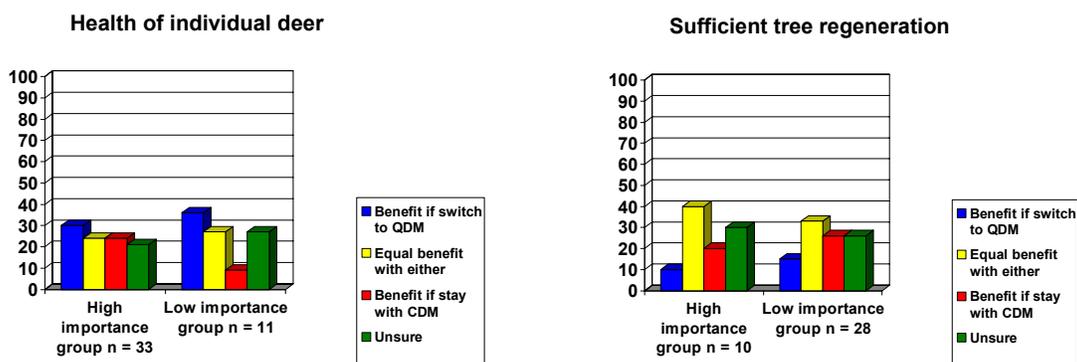


Figure 7 a, b. Percent of respondents assuming (a) healthier individual deer and (b) greater tree diversity will be more likely under quality deer management (QDM) vs. conventional deer management (CDM), comparing hunters who indicated these outcomes were “very important” (high-importance group) with hunters who place less importance on these outcomes (low-importance group).

What are desired/acceptable levels of impacts for landowners and hunters, and how do existing levels differ from these levels?

For landowners, we compared current and desired levels of four positive impacts, and current and acceptable levels of four negative impacts (Table 10). Landowners indicated that current levels were above desired (i.e., objective) levels for (1) friendships with neighboring landowners, and (2) self-perception as a venison provider, but that current levels were below desired levels for (1) potential of getting “top dollar” for leasing hunting access, and (2) self-perception as a better-than-average hunter. Current levels exceeded acceptable (i.e., objective) levels for each of the four negative impacts we examined. These findings are aggregated for all landowners because of the small number of respondents. Thus, we could not identify areas of disagreement or uncertainty about current vs. objective levels for landowners who placed high importance on these impacts compared to those who placed less importance on them.

Table 10. Comparison of mean current levels and mean objective levels for eight possible deer-related impacts, perceived by landowners participating in a quality deer management (QDM) cooperative near King Ferry, New York, based on a mail survey in 2002. Levels based on a scale from 0 to 10.

Possible positive deer-related impacts	Current level	Desirable (objective) level
Interactions with neighboring landowners over deer-related issues allow me to have this level of friendship with them	4.7	2.7
Deer characteristics on my land could allow me to get this level of payment for leasing hunting access	3.3	3.5
Interactions I have with deer on my land allow me to demonstrate this level of “expertness” as a deer hunter	1.9	3.7
Interactions I have with deer on my land allow me to demonstrate this level of being a “venison provider”	2.6	2.3
Possible negative deer-related impacts	Current level	Acceptable (objective) level
Interactions with hunters make me have this level of fear about being shot by hunters shooting indiscriminately at deer	3.9	2.9
Interactions with deer make me feel this level of risk about losing income from deer damage to crops	4.4	3.5
Interactions with deer make me feel this level of frustration about deer damage to crops	4.6	3.5
Interactions with deer make me feel this level of risk that deer browsing with diminish tree species diversity in my woodlots	4.1	3.5

We also compared current and desired levels of four positive impacts and four negative impacts in the hunter survey. Because we had found differing assumptions between hunters in high-importance and low-importance groups for various possible impacts, we divided hunters into these groups when we examined current and objective levels of impacts (Table 11). Not surprisingly, given the near universal interest in trying-out QDM as an alternative to CDM, respondents in the high-importance groups generally indicated that current levels fell short of levels they desired. Also, respondents in the two groups generally disagreed about both current levels and objective levels.

Respondents who greatly valued fairness among hunters (i.e., high-importance group) indicated that they would need to experience higher levels of fairness than they currently did before they would say QDM was a success. Consistent with this finding, they also indicated that their current level of disappointment about lack of fairness among hunters exceeded the level of disappointment that they were willing to tolerate and still say that QDM was a success. Although respondents in the low-importance group for fairness thought the current level of fairness was below objective level, they underestimated the level of fairness desired by those who greatly valued it as an impact to be managed. Also, respondents in the low-importance group believed not only that the current level of disappointment about lack of fairness was much lower than current disappointment indicated by those in the high-importance group for fairness, but non-impact respondents also thought that the current level of disappointment was below a maximum tolerable level.

Two other potential negative impacts associated with the idea of fairness among hunters are an urgency to shoot the first buck that a hunter see and fear about being shot by others shooting indiscriminately at deer. Although respondents in the high-importance group for

Table 11. Comparison of mean current levels and objective levels for eight possible deer-related impacts, perceived by deer hunters who greatly valued each particular impact (high-importance group) and deer hunters who placed less importance on each (low-importance group), determined through a mail survey of hunters participating in a quality deer management (QDM) cooperative near King Ferry, New York in 2002. Levels based on a scale from 0 to 10.

Possible deer-related impacts	All respondents	High-importance group	Low-importance group
Current level of fairness among hunters	n = 46 4.8	n = 30 5.1	n = 15 4.1
Objective level of fairness	7.3	7.9	6.1
Current level of disappointment that some hunters are unfair to other hunters	n = 46 5.1	n = 30 5.9	n = 15 3.6
Objective level of disappointment	5.0	5.4	4.1
Current level of urgency to shoot first buck seen	n = 41 2.8	n = 4 5.0	n = 37 2.6
Objective level of urgency	4.2	6.0	3.8
Current level of fear of being shot by indiscriminant hunters	n = 43 3.9	n = 24 5.6	n = 19 2.1
Objective level of fear	3.7	4.3	2.8
Current level of risk of having to pay for repairs from a deer-vehicle accident	n = 42 4.8	n = 18 7.1	n = 24 2.9
Objective level of risk	4.3	4.6	3.9
Current level of self-perception as a better than average hunter	n = 46 5.6	n = 17 7.1	n = 28 4.7
Objective level of "expertness"	6.2	7.1	5.6
Current level of self-perception as a venison provider	n = 45 6.5	n = 9 7.4	n = 35 6.3
Objective level of "provider"	5.8	6.9	5.5
Current level of naturalness of the deer population	n = 46 5.5	n = 27 5.7	n = 19 5.2
Objective level of naturalness	6.8	7.2	6.2

urgency perceived a higher level of urgency compared to respondents in the low-importance group, current levels of urgency were below tolerable (i.e., objective) levels for both groups. Conversely, the current level of fear of being shot was much higher for those in the high-importance group compared to the low-importance group, and the current level exceeded a tolerable (i.e., objective) level of fear for those in the high-importance group but not those in the low-importance group.

We also found differences among those in high-importance and low-importance groups for risk of having to pay for repairs from deer-vehicle accidents. Those in the high-importance group perceived a higher current level of risk compared to those in the low-importance group. They also indicated that the current level of risk exceeded their tolerable level, whereas respondents in the low-importance group indicated that current levels of risk were tolerable.

Respondents in the high-importance groups for the two self-perceptions (i.e., being a better-than-average hunter and being a venison provider) perceived relatively high current levels of these outcomes, and perceived higher current levels than for respondents in the low-importance groups. The current level of self-perception as a venison provider is above the objective level for those who greatly value it, whereas the current level of self-perception for being a better-than-average hunter is equal to the desired objective level.

Respondents in both the impact and low-importance groups for the possible impact of a natural deer population perceived similar current levels of naturalness. For both groups, the current level is below desired objective level. Further, those in the low-importance group underestimated the level of naturalness desired by those who greatly valued it.

What kind of *social learning* among participants would be beneficial prior to making decisions about new “alternative management actions” to implement as part of QDM?

Several opportunities exist for *social learning* to occur among participants that will enhance collaborative decision making. The idea behind social learning is that facilitated group discussion can enhance common knowledge, awareness of issues of importance to each other, and understanding about why these issues are important. Greatest learning can occur through a process whereby stakeholders are “...thinking, discussing, and acting together” (Borrini-Feyerabend et al. 2000:12). This supports the notion that for collaborative decision making to be successful, participants in the collaboration need to go through a process of mutual, interactive learning because no one individual has all the answers (Wondolleck and Yaffee 2000). Indeed, it is possible that no two individuals share the same understanding of the management question they are trying to answer. In these situations, scientific knowledge (e.g., about deer population size, harvest rates, crop losses) may be necessary but insufficient without also having knowledge of areas of agreement or disagreement about what people in the group value about these things.

For example, many areas of disagreement and/or uncertainty exist about whether particular impacts would be more likely under QDM or CDM. This is particularly evident from examining simultaneously assumptions of hunters in the high-importance groups for nine possible impacts (Figure 8). Each circle in the figure represents hunters’ assumptions about a particular impact. Agreement or disagreement is indicated by the location of each circle, which is determined by the percentage of hunters who assumed the impact was more likely under CDM (x coordinate) vs. the percentage who assumed it was more likely under QDM (y coordinate). Uncertainty is indicated by the size of the circle, which reflects the percentage of hunters who were “not sure” whether that impact was more likely under one approach or the other.

Comparing Assumptions By **High importance groups**
About Outcomes Under CDM and QDM.

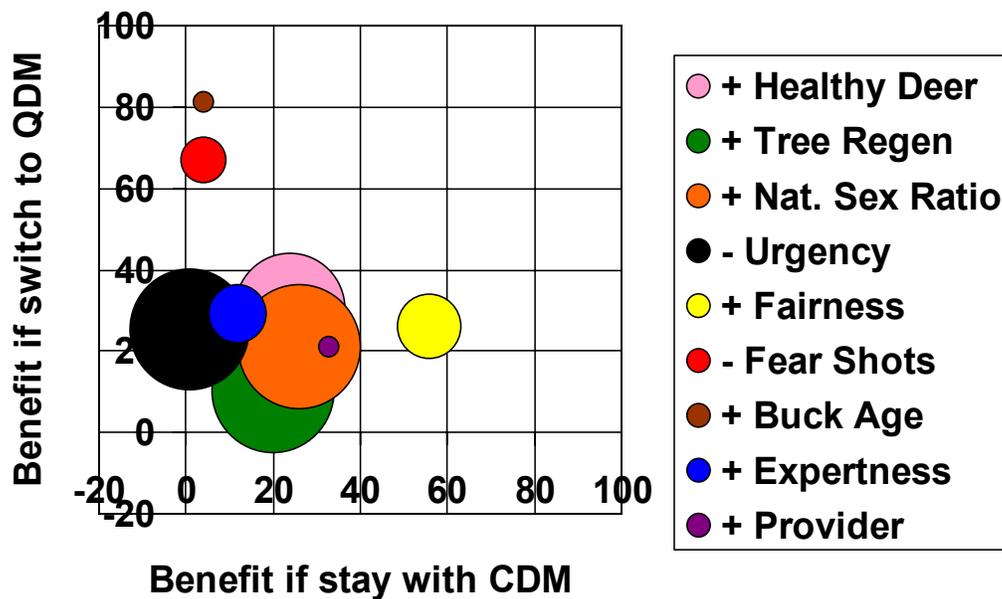


Figure 8. Simultaneous comparison of deer hunters' assumptions about whether staying with conventional deer management (CDM) or switching to quality deer management (QDM) will be more beneficial in terms of achieving nine potential outcomes of deer management, for hunters who highly valued each outcome. In the legend, a "+" indicates assumed increase in the outcome and a "-" indicates an assumed decrease.

Circles for six of the nine possible impacts are grouped in the bottom left corner of the graph. This indicates that even hunters who highly valued these impacts see little clear benefit (i.e., improvement) by either staying with CDM or switching to QDM as it currently is being implemented. More agreement seems to exist that (a) more natural buck age structure, and (b) less fear of being shot will occur with a switch to QDM, and that (c) fairness among hunters will be higher by staying with CDM.

Respondents' uncertainty is further reflected in large size of many circles. Smaller circles associated with being (a) a better-than-average hunter and (b) a venison provider indicate higher levels of certainty. However, many respondents for whom these were important fundamental ends thought they were equally likely under either management approach.

Additional areas of disagreement and uncertainty can be identified by examining simultaneously the assumptions of hunters in the low-importance groups (Figure 9). Perhaps of greatest importance in terms of collaborative decision making about alternative management actions is that respondents in the low-importance group had different assumptions, compared to those in the high-importance group for nearly all the possible impacts examined. For example, those in low-importance groups assumed that urgency to shoot the first buck seen would diminish and naturalness of the sex ratio would improve under QDM, whereas those who greatly valued these two impacts were less certain about whether either would be more likely under QDM or CDM. Thus, some hunters may support the idea of switching to QDM based on false assumptions about the benefits others may receive. Note also uncertainty about clear benefit under either QDM or CDM for the seven other possible impacts, indicated by their location in the bottom left corner of the graph.

The uncertainty indicated in Figures 8 and 9, and the perception that at least one positive impact (i.e., fairness among hunters) is more likely under CDM, suggest additional alternative management actions are needed to ensure success of the QDM cooperative. Collaborative decision making about alternative management actions to implement requires several kinds of social learning, especially among those hunters who greatly value specific outcomes. First, these hunters could learn from each other about the factors that affect perceived/experienced levels of impacts. Second, based on an improved understanding of the *system of factors* that influence the

Comparing Assumptions By **Low importance Groups**
About Outcomes Under CDM and QDM.

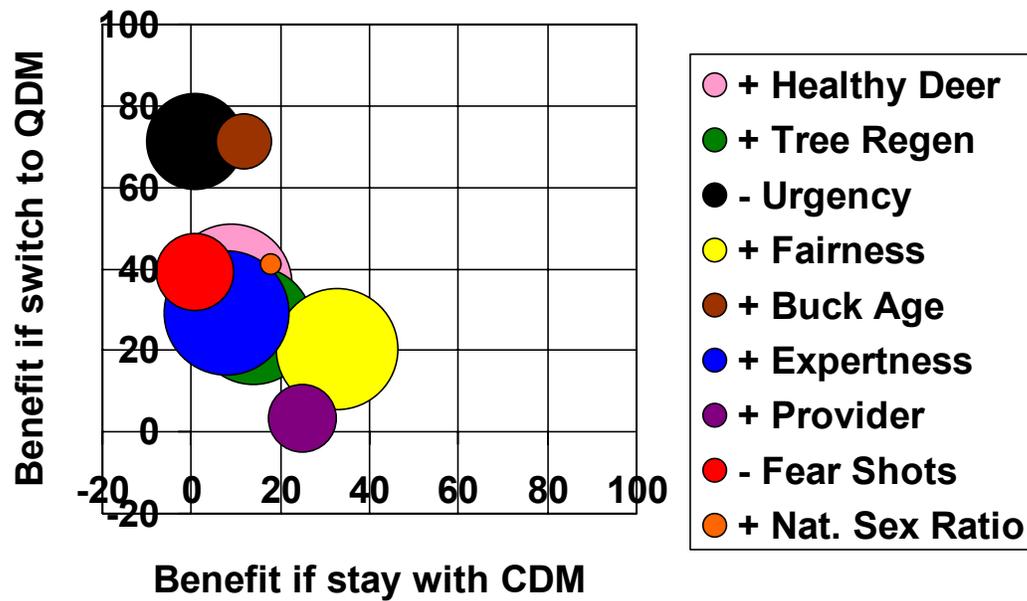


Figure 9. Simultaneous comparison of deer hunters' assumptions about whether staying with conventional deer management (DCM) or switching to quality deer management (QDM) will be more beneficial in terms of achieving nine potential outcomes of management, for hunters who placed relatively low importance on each outcome. In the legend, a "+" indicates assumed increase in that outcome, and a "-" indicates assumed decrease.

levels of those impacts (i.e., improved understanding of the *deer management system*), participants could benefit by discussing the kinds of alternative management actions they believe will lead to desired changes in the desired levels of impacts to be managed. Finally, participants can benefit by learning about areas of agreement and disagreement regarding current levels of each impact as well as desired/acceptable levels that could be established as management

objectives to achieve under QDM.

Learning about the system of factors that affect the various impacts would be beneficial for those in the low-importance groups for several reasons. First, it would improve their understanding of how impacts they do not value very highly may be related to impacts which are “very important” to them. Second, development of a revised, more accurate notion of the system of factors that affect levels of impacts could provide a sound basis on which they evaluate their support/opposition to any alternative management actions.

Additional benefit can be gained if social learning among all participants is directed at better understanding current and objective levels of impacts. Respondents in the high-importance groups for the four positive impacts we examined consistently perceived higher current levels and desired higher objective levels, compared to respondents in low-importance groups. However, consistent underestimating on the part of hunters in the low-importance groups may not have much practical significance given that their perceptions about whether objective levels are being met generally matched perceptions of those in the high-importance groups. Respondents in both groups perceived naturalness of the deer population and fairness among hunters to be lower than desired, and both groups perceived the level of self-perception as a venison provider to be adequate. Still, better understanding of the relatively high levels desired by those in the high-importance groups could improve decisions about what alternative management actions may need to be implemented under QDM.

Even greater benefit could be gained through social learning focused on current and objective levels of negative impacts to be managed. For three of the negative impacts we examined, respondents in the high-importance group indicated not only higher current levels compared to those in the low-importance groups, but they also indicated that tolerable levels had

been exceeded. Hunters in the low-importance groups clearly lacked understanding about the need for management actions focused on achieving lower levels of these negative impacts.

Identifying alternative management actions depends on understanding factors that affect a particular impact to be managed and the relationships between those factors and the level of the impact. In other words, it depends on understanding the system of interrelationships involved. Taken together across all impacts to be managed, the broad set of interrelationships can be thought of as the *deer management system*. Although deer managers may have a particular conception of the deer management system (D. Reihlman, DEC, personal communication), participants in the QDM cooperative have other conceptions. Better collaborative decision making likely would occur if hunters, landowner, and DEC deer managers had a shared mental model of what this system looked like. Figure 2 presented earlier depicts our rendition of hunters' initial conception of the deer management system, and Appendix A depicts our rendition of landowners' initial conception.

Through the social learning that occurred in the small group discussions with hunters, participating hunters revised their conception of particular parts of the deer management system. A key step in revising their conception was to identify a single, particular impact and to discuss the various factors that either increased or decreased its level, as well as the relationships among these factors. We then used the mail survey to quantitatively calibrate some of the important relationships.

What is the hypothesized model of the deer management system for the impact referred to as “fairness among hunters”?

Hunters in the small groups hypothesized that level of fairness is influenced most by the

proportion of other hunters who comply with the QDM harvest standard by which hunters are supposed to pass-up shots at small bucks (Figure 10). If most hunters comply and pass-up small bucks, perceived level of fairness will be high, most hunters will be satisfied that QDM is working, and they will be willing to continue participating in the cooperative. However, if the proportion of “cheaters” starts increasing, level of fairness will decrease and hunters will become increasingly disappointed at the lack of fairness being demonstrated by other hunters. As disappointment increases, hunters’ sense of urgency to shoot the next antlered buck they see (regardless of whether it meets the harvest standards) increases. Essentially, their willingness to continue pass-up shots at small bucks erodes when they think others are shooting small bucks. As level of urgency increases, harvest of small bucks increases, and perceived level of fairness further decreases.

The relationship between compliance, fairness, urgency, harvest of smaller bucks, and back to compliance is critically important because it can operate as a reinforcing, negative feedback loop. Level of fairness can be likened to water behind a dam, and urgency to take the next antlered buck seen can be likened to the pressure of water squeezing through a hole in the dam. When a little bit of water (fairness) starts to leak out of the dam, pressure (urgency) on the hole builds, and fairly quickly the little leak can become a torrent. If that happens, not only will the fundamental objective of fairness drop below the level desired, but it is unlikely that other objectives related to changes in the buck age structure can be achieved (e.g., seeing and harvesting mature bucks, naturalness of the deer population, self-perception as a better-than-average hunter) because small bucks will not live long enough to become mature bucks.

"Fairness among hunters"
component of satisfaction

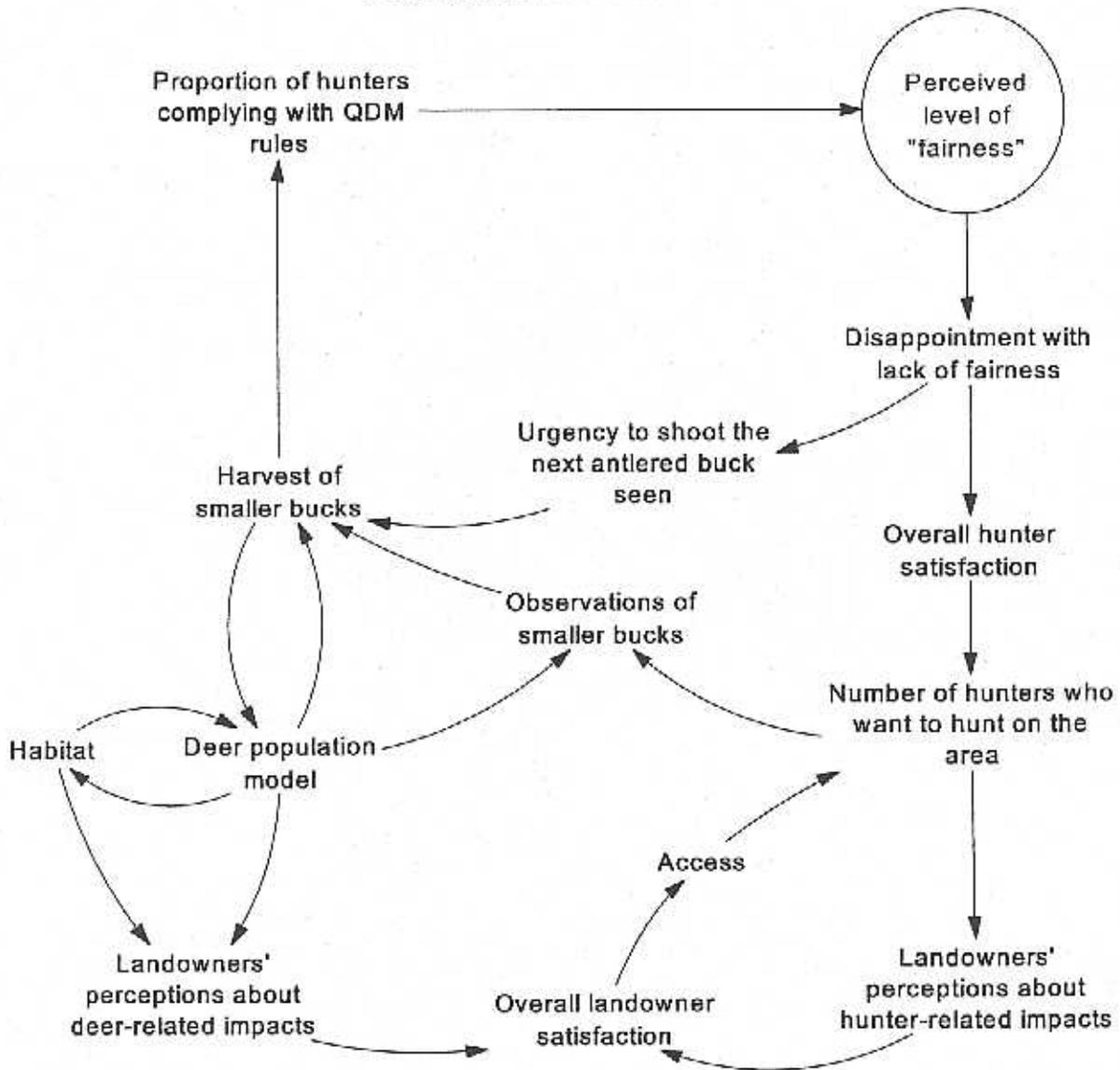


Figure 10. Model of factors affecting level of fairness among hunters (i.e., that all hunters are "playing by the same fair rules"), as described by a small group of hunters participating in a Quality Deer Management (QDM) cooperative near King Ferry, New York in 2002.

The hypothesized model of factors affecting level of fairness that we generated from the small group discussions was supported by results from the survey. Current level of fairness is below the desired (objective) level and disappointment about lack of fairness among hunters exceeds the level tolerated by hunters (refer to Table 9). These levels reflected the high proportion of hunters who were thought to have cheated during the first hunting season under QDM. Survey respondents estimated that about 30% of all participating hunters shot small bucks that did not meet the agreed-upon harvest standards. Although only 14% of respondents reported taking an antlered buck of any size on the QDM area (and no other harvest data were collected by any other means), the magnitude of suspected “cheating” substantially diminished the perceived level of fairness. Apparently, respondents are willing to tolerate only low levels of non-compliance with the QDM harvest standards for bucks.

From the survey, we calibrated the relationship between proportion of hunters not complying with the QDM harvest standard and disappointment about lack of fairness (Figure 11). Disappointment increases substantially when >6% of hunters are thought to be “cheating” by taking small bucks. Figure 16 and the estimated 30% rate of non-compliance both support the finding that current level of disappointment is high and is above a tolerable (i.e., objective) level.

We also calibrated the relationship between perceived rate of non-compliance with the buck harvest standard and hunters’ sense of urgency to take the next antlered buck they see, regardless of whether it meets the standard (Figure 12). Urgency is relatively low when non-compliance is thought to be low, but increases quickly as non-compliance increases.

Comparison of current level of urgency (refer to Table 9) and the level of urgency that hunters associated with the 30% rate of perceived non-compliance seems inconsistent; we would expect

current level of urgency to be higher based on Figure 12.

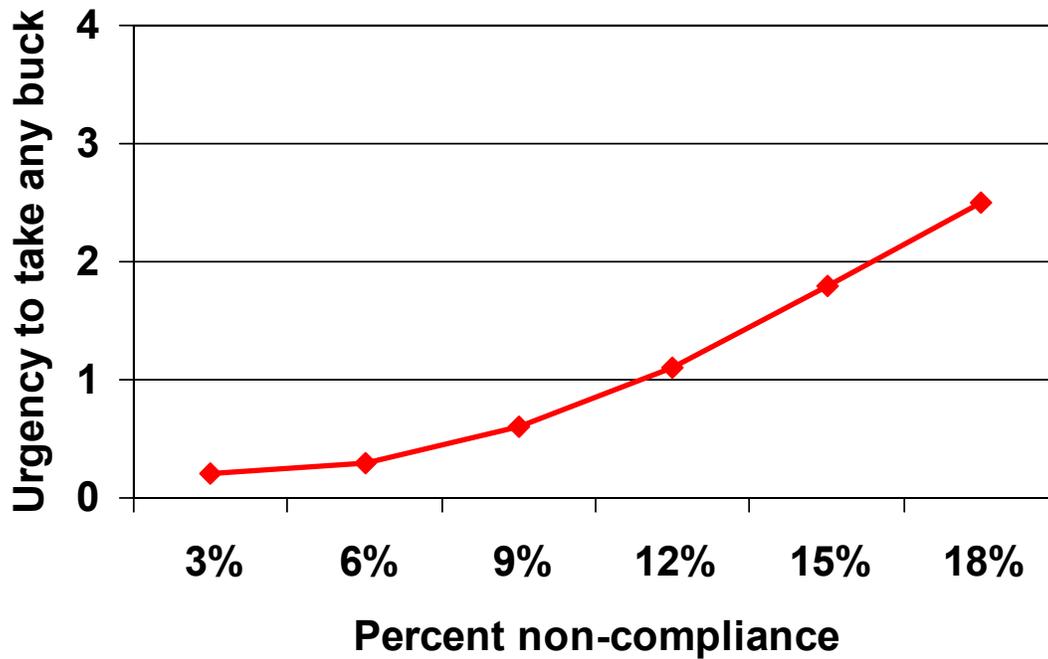


Figure 11. Relationship between the perceived percentage of hunters not complying with a quality deer management (QDM) regulation to pass-up shots at smaller antlered bucks and hunters' level of disappointment about lack of fairness shown by other hunters, from a mail survey of hunters participating in a QDM cooperative near King Ferry, New York in 2002. Disappointment is scaled from no disappointment at all (0) to complete disappointment (4).

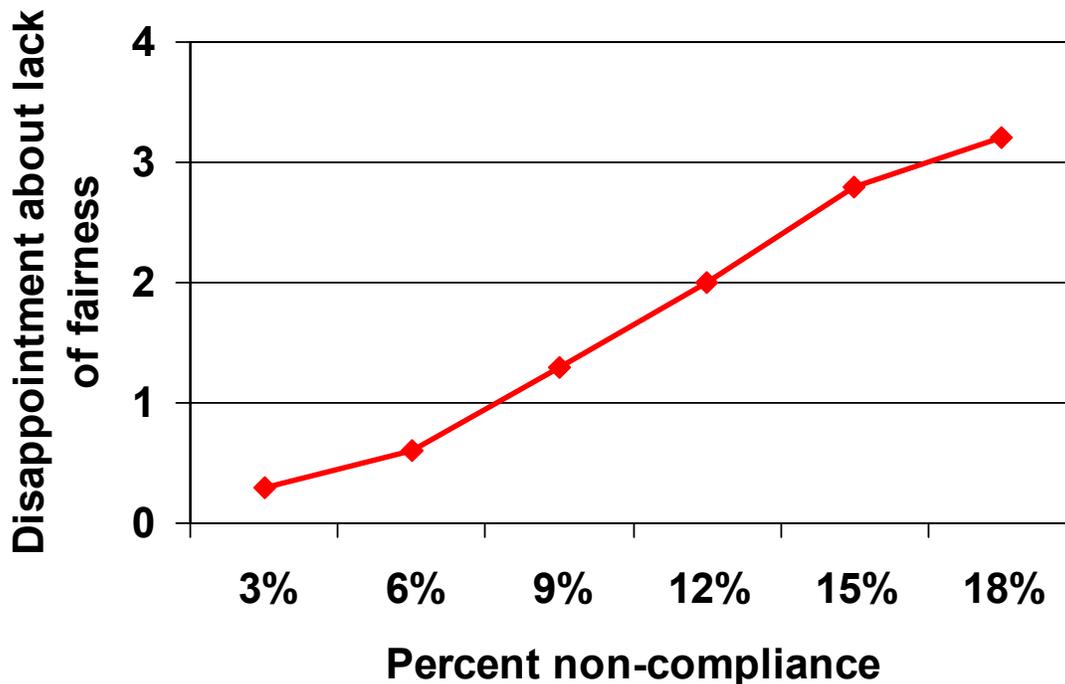


Figure 12. Relationship between the perceived percentage of hunters not complying with a quality deer management (QDM) regulation to pass-up shots at smaller antlered bucks and hunters' sense of urgency to shoot the next buck they see, from a mail survey of hunters participating in a QDM cooperative near King Ferry, New York in 2002. Urgency is scaled from no urgency at all (0) to complete urgency (4).

A plausible explanation for this discrepancy is that level of urgency to harvest the next antlered buck seen also is affected by other factors besides perceptions of fairness. For example, most respondents (78%) indicated that they would feel at least moderately disappointed in themselves if they did not hold out for a mature buck, and 27% said they would feel “completely disappointed” in themselves if they “cheated.” Perhaps the amount of increase in urgency related to disappointment with lack of fairness among hunters is dissipated to some extent by their desire to uphold personal values about complying with the QDM harvest standard.

Another possible explanation emerged from hunters in small group discussions who suggested that their urgency to shoot the next buck they see is held in check by desire to increase their self-perception as a better-than-average hunter. According to those in the small groups, this self-perception is diminished if they harvest a small buck (Figure 13). Under this scenario, the relationship between self-perception as a better-than-average hunter, urgency to harvest the next buck seen, and harvest of small bucks would act as a counteracting loop. When the level of self-perception deviates too far from the objective level, urgency should adjust correspondingly.

However, recall that the current level of this self-perception was about equal to the level desired (refer to Table 9). We are uncertain about how the level of urgency would change if the level of self-perception as a better-than-average hunter decreased below the minimum acceptable level. We could not examine these relationships due to space constraints in the survey. Nonetheless, the apparent discrepancy between current level of urgency to take the next antlered buck seen and the level that *should* correspond to the 30% estimated rate of non-compliance with QDM rules highlights the need for better understanding about the relationships between the impacts to be managed and the sets of influencing factors that encompass participants' conception of the deer management system.

What is the hypothesized model of the deer management system for the impact referred to as “naturalness of the deer population”?

Another possible moderating influence on hunters’ urgency to harvest the next antlered buck seen is their perception of the naturalness of the deer population. Although we have no survey data to explore relationship between naturalness and urgency, we used survey results to calibrate the influence of hunters’ observations of the deer sex ratio and buck age structure on their perceptions of naturalness of the deer population. Hunters in the small groups had identified these factors as important influences on naturalness (Figure 14). To them, a natural deer population has a relatively balanced ratio of female and male deer, and a noticeable age structure among antlered bucks. Further, a deer population that is skewed towards antlerless deer or lacks older age classes of bucks “...feels unnatural, like it is manufactured by hunting.”

Hunters in the small groups hypothesized that level of naturalness should increase if (1) sex ratio becomes less skewed towards antlerless deer, and (2) proportion of older, antlered bucks increases. In turn, if naturalness increases, hunter satisfaction should increase, and willingness to continue participating in the QDM cooperative should remain high. If naturalness is too low (i.e., below objective), hunters’ (1) willingness to harvest antlerless deer should increase to bring the sex ratio more into balance, and (2) urgency to harvest the next buck they see regardless of its age should decrease to allow more bucks to live to maturity.

Survey data supported the hypothesized model inasmuch as the current level of naturalness is below objective level (refer to Table 9), and both sex ratio and buck age structure were perceived to be skewed. The average sex ratio reported was about 75 antlerless deer and 25 antlered bucks out of every 100 total deer observed (3:1 ratio). The average age structure was about 8 small bucks and 2 mature bucks out of every 10 total bucks (4:1 ratio).

"Naturalness of the deer population" component of satisfaction

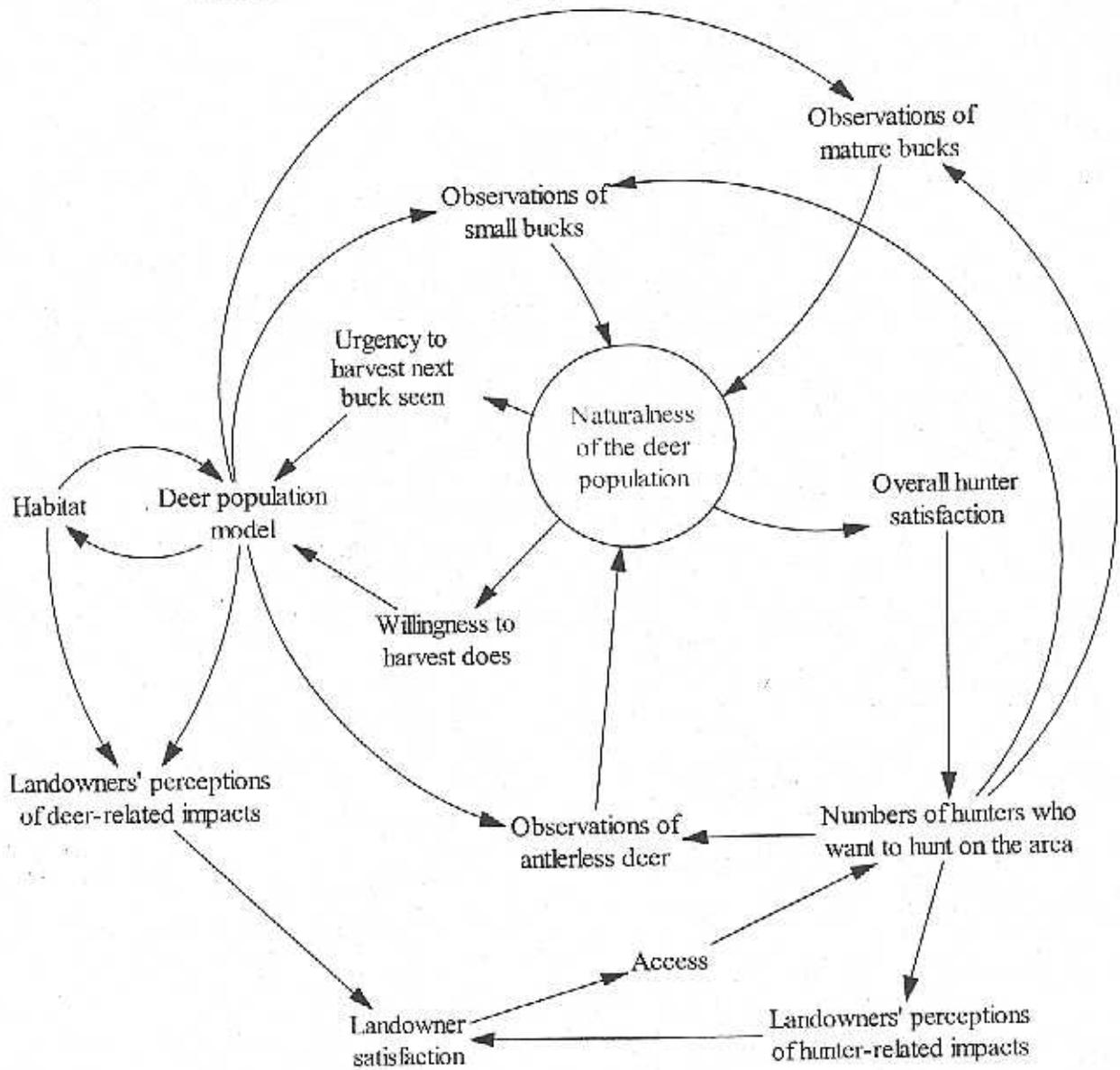
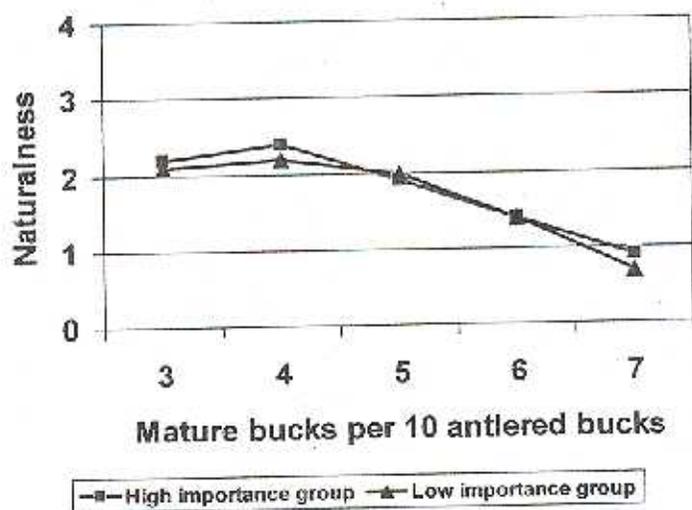


Figure 14. Model of factors affecting hunters' perceptions of the naturalness of the deer population, as described by a small group of hunters participating in a Quality Deer Management (QDM) cooperative near King Ferry, New York in 2002.

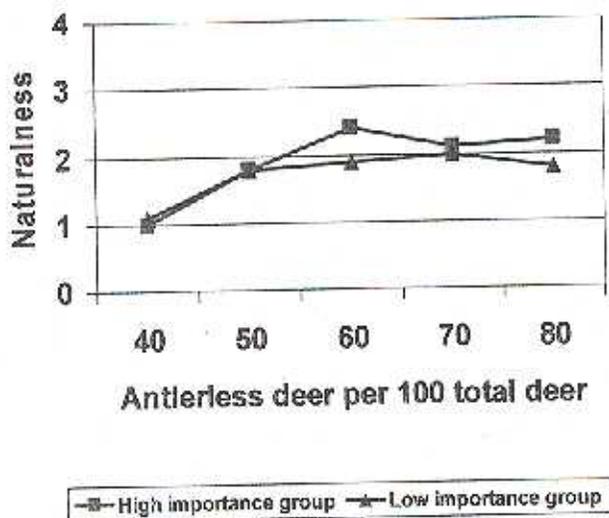
Respondents in the high-importance groups for natural sex ratio and natural buck age structure thought these deer population characteristics were even more skewed than respondents in the low-importance groups (Table 12). However, respondents in high-importance and low-importance groups associated similar levels of naturalness with various deer sex ratios (Figure 15a), and with various buck age structures (Figure 15b). Thus, differences between high-importance and low-importance groups with respect to current level of naturalness (refer to Table 9) can be explained by different perceptions of the deer sex ratio and buck age structure, rather than differences in level of naturalness associated with various ratios and structures.

Table 12. Comparison of deer sex ratio and buck age structure estimated by hunters who greatly value naturalness of the sex ratio and buck age structure as outcomes to be achieved through management (high-importance groups) and hunters who place less importance on naturalness (low-importance groups), from a mail survey of hunters participating in a quality deer management (QDM) cooperative near King Ferry, New York in 2002.

<u>Deer population characteristic group</u>	<u>High-importance group</u>	<u>Low-importance</u>
Deer sex ratio prior to QDM (out of 100 total deer)	(n = 21)	(n = 25)
mean no. antlered bucks	22	28
mean no. antlerless deer	78	72
Buck age structure prior to QDM (out of 10 total antlered bucks)	(n = 27)	(n = 18)
mean no. mature bucks	1.5	2.7
mean no. small bucks	8.5	7.3



a.



b.

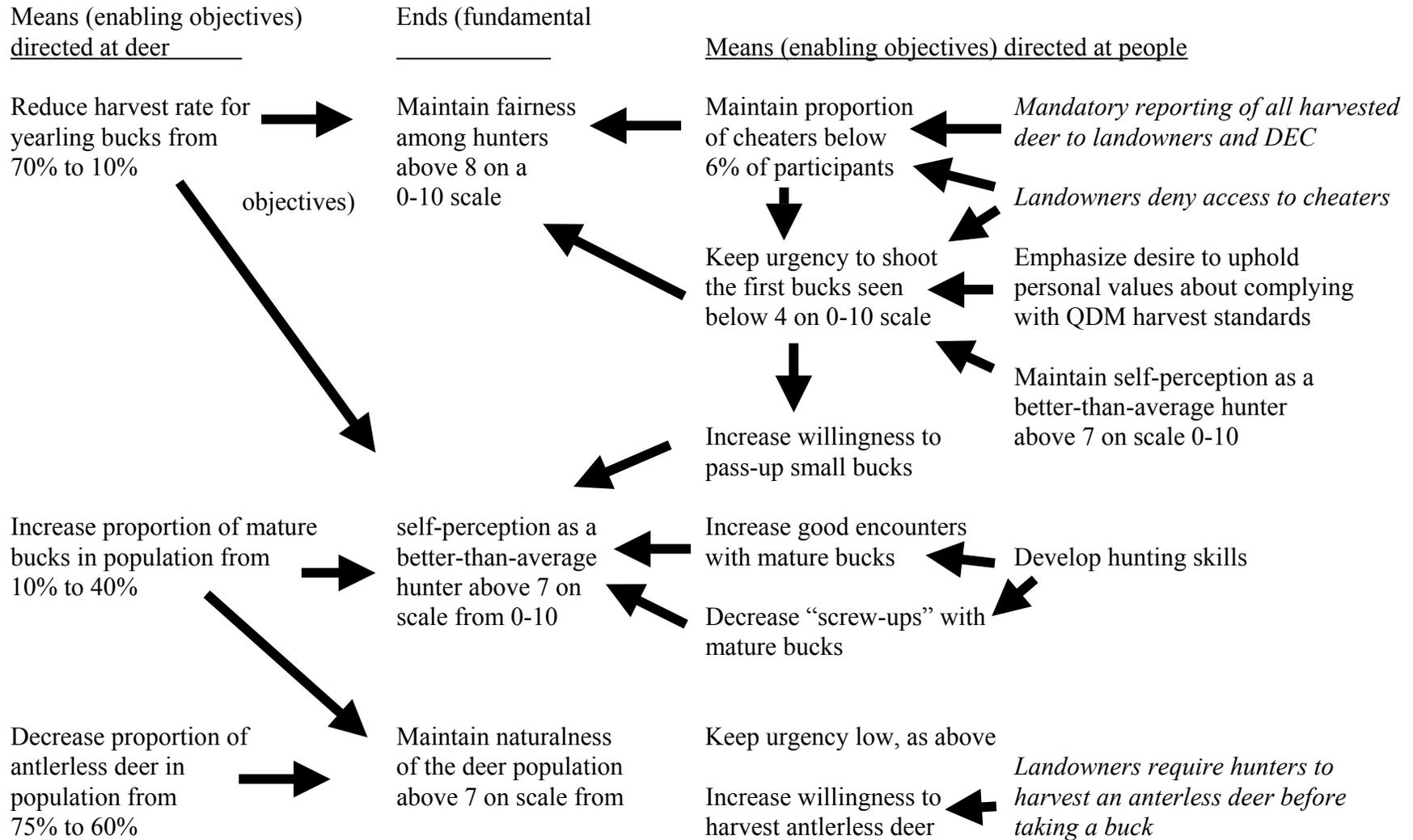
Figure 15. Naturalness of the deer population associated with (top) various deer sex ratios, and (bottom) various buck age structures by deer hunters for whom naturalness is "very important" (high-importance group) and hunters who place less importance on naturalness (low-importance group), from a mail survey of hunters participating in a quality deer management cooperative near King Ferry, New York in 2002. Naturalness is scaled from not at all natural (0) to completely natural (4).

Naturalness increases from “not very natural” when the sex ratio is about 40 antlerless deer per 100 total deer to a peak between “moderately” and “very natural” when the sex ratio is about 60 antlerless deer per 100 total deer. However, higher sex ratios of 70 and 80 antlerless deer per 100 total deer still were considered “moderately natural.” For buck age structure, a “moderately natural” level occurs when there are 4 mature bucks out of every 10 antlered bucks. Naturalness diminishes substantially as the proportion of mature bucks increases from 4 to 7.

Based on the preceding discussion about portions of the deer management system pertaining to deer-related impacts referred to as fairness among hunters, being a better-than-average hunter, and naturalness of the deer population, we developed an example of a revised means-ends matrix (Figure 16). This matrix shows how achievement of management ends desired by hunters (i.e., fundamental objectives) likely would require means (i.e., enabling objectives) directed at both deer and people. We developed this example as a starting point for discussion, but the greatest benefit in terms of social learning value likely would occur if participants developed a matrix based on insights from this report and further facilitated discussions.

What alternative management actions are landowners willing to implement, and would they be successful based on the revised conception of the deer management system?

We asked landowners in the mail survey to indicate the various ways in which they would be willing to participate in the cooperative in future years. One-half or more of the responding landowners indicated they were willing to take actions that could increase the success of the cooperative (see italics enabling objectives in Figure 16). In particular, 56% said they were willing to require hunters to harvest an antlerless deer on their property before being



Maintain

Figure 16. An example of a revised management means-ends matrix for three deer-related impacts of importance to hunters participating in a quality deer management (QDM) cooperative near King Ferry, New York.

allowed to take a buck. Fifty percent of landowners said they were willing to have hunters report all harvested deer to them and then pass that information along to DEC. Forty-four percent said they were willing to deny access to hunters who “cheated” and did not abide by the QDM harvest standards. However, relatively few said they were willing to attend meetings to revise rules (33%), allow additional hunters to have access to their property (22%), or talk with other landowners about alternative management actions (6%).

What were baseline levels of satisfaction and willingness to continue with QDM?

After one season of QDM experience, a majority of hunters (58%) and landowners (61%) were satisfied. One out of six hunters (19%) was dissatisfied; with 14% greatly dissatisfied. Only one landowner was dissatisfied (greatly).

About one-half of hunters (51%) indicated that they were even more willing to participate now after one season of experience with QDM, but 12% said they were less willing to participate. Willingness to participate had not changed for the remainder of the hunters. Similarly, willingness to participate had not changed for most landowners (72%), with the rest split between being more willing and less willing. Given our findings that many important deer-related impacts were below desirable levels or above tolerable levels, however, participants’ satisfaction and willingness to continue may erode quickly if they do not perceive improvement in desired/tolerable levels of impacts.

CONCLUSIONS

Landowners' and hunters' willingness to try QDM seems to be based on their assumptions about how the deer management system works and how outcomes of that system can be changed by adopting QDM harvest standards as an alternative management action to CDM. However, those assumptions generally do not reflect well the fundamental ends that participants seek (i.e., the deer-related impacts to be managed) or the system of factors that influence levels of those ends. Thus, not surprisingly, current levels of positive impacts generally are below desired levels and current levels of negative impacts generally exceed tolerable levels. Further, disagreement and uncertainty exist within the landowner and hunter groups with respect to whether fundamental objectives associated with impacts are more likely to be achieved under QDM or CDM. Therefore, before hunters and landowners can make decisions about alternative management actions to implement under QDM, several kinds of social learning are needed.

First, a better understanding is needed about which impacts to focus on as fundamental objectives of QDM. For example, of the various possible impacts we examined, majorities of hunters indicated that 4 positive impacts were "very important" and that they were "very concerned" about 2 negative impacts. Do hunters agree that these are the most appropriate impacts to manage? Do new impacts emerge from the discussions, particularly negative psychological impacts associated with economic and health risks from deer? For example, a minority of respondents was very concerned about the cost of deer-vehicle accidents, but we do not know whether the percentage would increase if we had asked specifically about frustration with having to pay for repairs, risk of having to pay for repairs, or excessiveness of the cost of repairs.

Second, greater understanding is needed about the systems of factors affecting the various impacts. The success of collaborative decision making in identifying and implementing alternative management actions depends greatly on everyone sharing the same conception of the deer management system. Our results suggest that various hunters, landowners, and DEC staff have different conceptions. Social learning about the deer management system occurred among participants in the small group discussions, but that learning needs to be extended to the broader group of hunters and landowners participating in the cooperative.

Hunters taking part in the small groups developed a shared notion that basic relationships among certain factors (and their associated feedback loops) increase or decrease levels of impacts. However, some relationships hypothesized by hunters who took part in the small group discussions were not supported by findings from the mail survey. Survey respondents indicated that naturalness of the deer population was lower than desired. Hunters in the small groups had hypothesized that low levels of naturalness were associated with skewed sex ratios and buck age structures, and survey respondents indeed reported that these were skewed. However, the current level of naturalness perceived by survey respondents did not correspond to the level that they associated with the observed, average sex ratio and buck age structure.

Some discrepancies may have occurred because the same factor affects multiple impacts. Other discrepancies may have resulted from poor understanding about the magnitude or nature of the effect of a given factor on an impact. For example, very few hunters were concerned about their urgency to shoot the next buck they see regardless of its age, and hunters reported that their current level of urgency is fairly low. However, insights about the system of factors affecting fairness among hunters indicate that urgency is like a leak in a dam. It may start out small, but increase quickly, and thus drain the level of fairness perceived among hunters.

Third, collaborative decision making might be improved by understanding why respondents in the low-importance groups consistently rated lower current levels of impacts compared to respondents in the high-importance groups. Were different perceptions of current levels related to misunderstanding about the management system affecting given impacts? If so, support for or opposition to various alternative management actions could be affected.

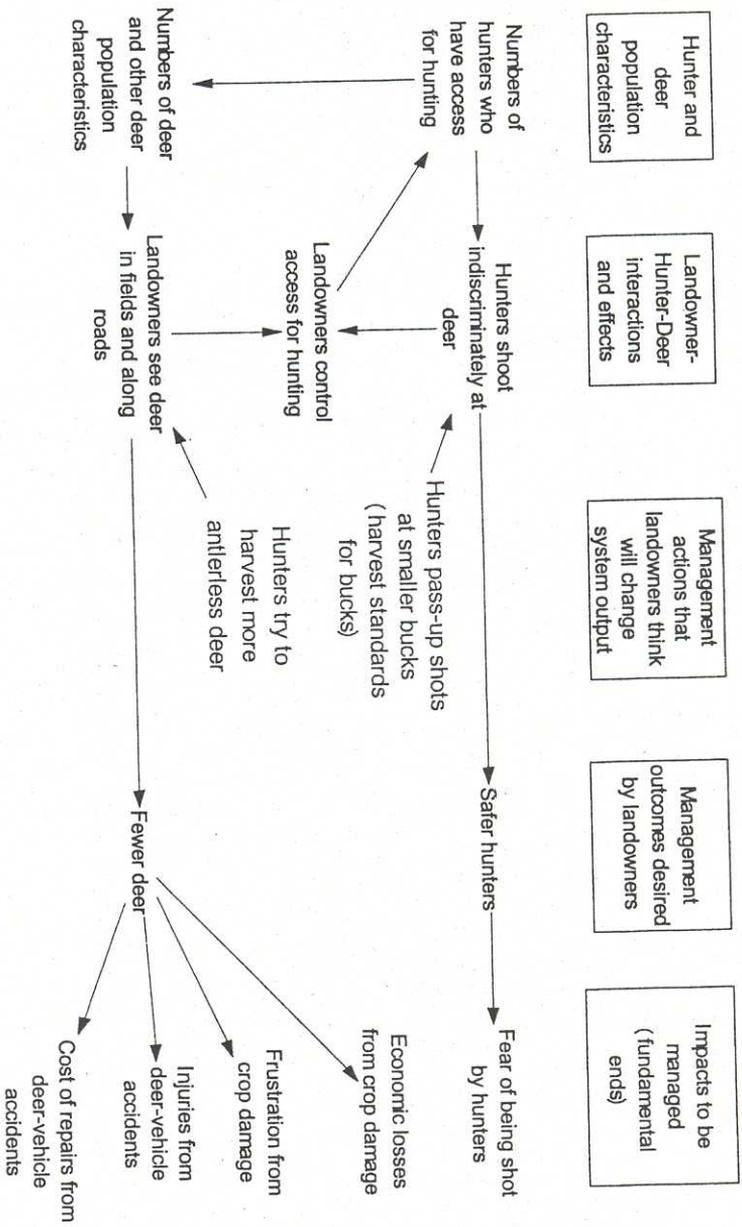
Fourth, social learning is needed about the appropriate objective levels for impacts to be managed. We determined desired/tolerable levels for a few possible impacts, but do not know whether these levels are realistic or achievable because of trade-offs among the impacts. For example, the current level of self-perception associated with being a venison provider exceeds the objective level, and small group discussions revealed that this probably is because hunters have plenty of opportunity to harvest antlerless deer. On the other hand, naturalness of the deer population currently is too low and may be related to some extent by a sex ratio skewed toward antlerless deer. What are realistic levels of naturalness and being a venison provider that can be achieved simultaneously? What trade-offs may need to occur for other impacts?

Finally, with a revised conception of the deer management system developed through these opportunities for social learning, participants can better identify alternative management actions to implement as part of QDM. The antler restriction currently implemented as an alternative to CDM may not be sufficient by itself to achieve any of the fundamental objectives important to participants. Hunters and landowners initially identified this management action based on the assumption that it would result in different kinds of interactions with deer compared to those they experience under CDM. Indeed, regulating buck harvest through an antler restriction may be a necessary but insufficient action. In particular, actions focused on minimizing hunters' urgency to shoot the next antlered buck they see also may be necessary.

Requiring hunters to register harvested deer at a check station, and/or encouraging landowners to deny access to hunters who do not comply with the antler restriction are just two examples of actions that landowners indicated they were willing to implement, and which may be necessary for success of the cooperative.

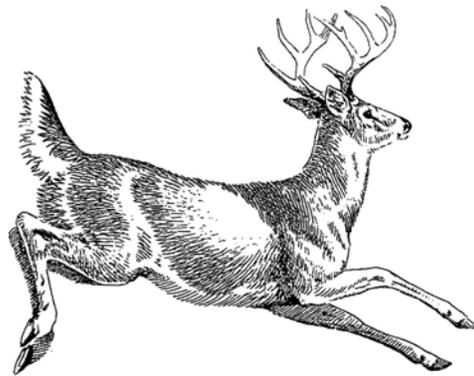
LITERATURE CITED

- Alsheimer, C. 2003. The QDM quandary. *Deer and deer hunting* 27(3):110-129.
- Borrini-Feyerabend, G., M. T. Farvar, J. C. Nguinguiri, and V. A. Ndangang. 2000. *Comanagement of natural resources: organizing, negotiating, and learning-by-doing*. GTZ and IUCN. Kasperek Verlag. Heidelberg, Germany.
- Riley, S. R., D. J. Decker, L. H. Carpenter, J. F. Organ, W. F. Siemer, G. F. Mattfeld, and G. Parsons. 2002. The essence of wildlife management. *Wildlife Society Bulletin* 30(2):585-593.
- Riley, S. R., W. F. Siemer, D. J. Decker, L. H. Carpenter, J. F. Organ, and L. T. Berchielli. 2003. Adaptive impact management: an integrative approach to wildlife management. *Human Dimensions of Wildlife* 8:81-95.
- Wondolleck, J. M. and S. L. Yaffee. 2000. *Making collaboration work: lessons from innovation in natural resources management*. Island Press. Washington, DC.
- Woods, G. R., D. C. Guynn, W. E. Hammitt, and M. E. Patterson. 1996. Determinants of participant satisfaction with quality deer management. *Wildlife Society Bulletin* 24(2):318-324.



Appendix A. A model of landowners' conception of the deer management system showing their assumptions about relationships between the interactions they have with deer and hunters and resulting deer-related impacts (fundamental ends) that they want managed, based on a group interview with landowners participating in a quality deer management (QDM) cooperative near King Ferry, New York in 2002.

Longitudinal Evaluation of a Quality Deer Management Cooperative, King Ferry, NY: Final Report



August 2009

HDRU Series No 09-9

Prepared by:

Jody W. Enck and Tommy L. Brown
Human Dimensions Research Unit
Department of Natural Resources
Cornell University

HUMAN DIMENSIONS RESEARCH UNIT PUBLICATIONS SERIES

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>.



This report is available electronically at: <http://www.dnr.cornell.edu/hdru/pubs/Elecpubs.asp>.

EXECUTIVE SUMMARY

In November 2000, deer managers with the New York State Department of Environmental Conservation (DEC) met with landowners and deer hunters within a 16,000ac area in the vicinity of King Ferry, NY with the idea of establishing a quality deer management (QDM) cooperative as an incentive for greater deer harvest, and therefore a means of reducing concerns about crop damage and deer-related vehicle accidents and improving the deer sex ratio and buck age structure. Many landowners and hunters who typically hunted deer on those properties initially embraced the idea of QDM at that time, but decided to establish at a later date the specific harvest criteria that would be applied through QDM. DEC asked staff with the Human Dimensions Research Unit (HDRU) at Cornell University to evaluate this case of QDM as it was being applied at King Ferry in May 2001. By August 2001, DEC decided that enough landowners and hunters wanted to participate that the QDM initiative should be implemented for the upcoming hunting season. In October 2001, landowners and hunters decided to establish voluntary antler restrictions and voluntary emphasis on harvesting more antlerless deer.

HDRU staff engaged participating landowners and hunters in a large-group discussion in September 2001 to elicit important desired outcomes and concerns associated with participation in QDM. With the assistance of the participants, HDRU staff also identified a set of positive and negative impacts that landowners and hunters believed would be managed through QDM. During the period October 2001 through May 2002, HDRU staff worked with small groups of landowners and hunters to describe and “map” participants’ assumptions and reasoning about how QDM would manage the identified impacts. Substantial social learning occurred in the small group discussions: (a) as participants articulated and revised their conceptual models of the deer management system with respect to the QDM cooperative, and (b) improved their capacity to think about how to improve management success. Much of what was learned in small-group discussions was not transferred well to the larger group of participants.

Our evaluation revealed several important insights about QDM as applied in this case, and about trying to manage for desirable/tolerable levels of deer-related impacts through any deer management intervention. One insight was that negative impacts associated with seeing deer were consistent regardless of location where the observations occurred. For example, regardless of whether landowners saw deer around home, in their crop fields, or along local roads, such sightings led to anxiety about the possibility of having deer-vehicle accidents among large majorities of landowners. On the other hand, positive impacts seem to be more context-specific. Most landowners recognize a sense of “feeling connected to nature” when they see deer around home or in their farm fields, but not when they see live deer near local roads.

Another insight supported by our data, but needing more research attention, is that negative impacts seem to carry more weight than positive impacts in landowners’ preferences for changes in the deer-related interactions that contribute to those impacts. For example, landowners who reported intolerable levels of frustration about crop damage also preferred a decrease in “seeing deer” interactions around home and in their crop fields, regardless of whether positive impacts associated with such sightings were at desirable levels or were too low.

Landowners also apparently consider collateral impacts when developing preferences for changes in deer-related interactions. Despite almost universal interest in reducing intolerable

levels of several negative impacts, landowners' concern about being injured by hunters shooting unsafely at deer or interfering with their own hunting experiences limited their willingness to provide access for more hunters on their properties. The low willingness to allow access for more hunters highlights a challenge for QDM or any other deer management intervention to be implemented effectively across large areas. These findings also highlight the importance of identifying and managing collateral impacts that may influence landowners' behaviors.

A surprising finding was that a majority of both landowners and hunters were willing to continue participating in the QDM cooperative despite what they saw as lack of progress as manifested through the intolerable or undesirable levels of impacts they experienced to date. Although negative impacts have greater influence than positive impacts on preferences for changes in contributing interactions, positive impacts (experienced or expected) have more influence on their willingness to continue. Specifically, landowners' and hunters' beliefs that QDM will eventually result in desired outcomes seems to be a stronger motivation to continue participating than the lack of management success they have experienced is a cause to quit.

The QDM cooperative at King Ferry included landowners with a range of interests (some enthusiastic and some disinterested) in QDM. Deer hunters also varied in their interest in QDM. Some of the hunters typically having access to properties participating in the program wanted to engage in QDM, but others did not. Unlike DEC's experiences elsewhere in which hunting clubs or single landowners asked for assistance establishing a QDM plan, in this situation the landowner and hunters who were interested in QDM could not agree on a galvanizing purpose and collective commitment to implement QDM consistently across properties.

ACKNOWLEDGMENTS

We greatly appreciated support of staff from the New York State Department of Environmental Conservation (DEC), Bureau of Wildlife, particularly Dave Riehlman and Wayne Masters. All members of the DEC Deer Team provided input and conceptual assistance, particularly for the various surveys. We are especially grateful to the many landowners and hunters who met with us and who responded to the surveys. We thank members of the King Ferry volunteer fire department for use of their facility for the small group discussions.

Several staff from the Human Dimensions Research Unit (HDRU) in the Department of Natural Resources at Cornell University provided assistance with the small group discussions, including: Bill Siemer, Karlene Smith, and Tania Schusler. Karlene Smith also assisted with implementation of the mail surveys. Margie Peech provided secretarial support and helped develop figures in the report. Dan Decker reviewed drafts and provided comments for revision of the report. Cornell University's Survey Research Institute (SRI) conducted telephone interviews of landowners and hunters.

Funding for this study was provided by the following grants: New York Federal Aid in Wildlife Restoration Grant WE-173-G, Job 146-6.4.3, and Multi-state Hatch Grant NC-1005.

TABLE OF CONTENTS

Executive Summary	i
Acknowledgments.....	iii
Table of Contents.....	iv
List of Tables	v
List of Figures.....	vi
Introduction.....	1
Background About The QDM Cooperative at King Ferry	1
The General Idea of QDM	1
The Intervention: Application of QDM Harvest Standards on the Cooperative	1
Conceptual Foundation for the Evaluation	1
Study Objectives	2
Methods.....	2
Synthesis of Results and Discussion.....	3
2002 Pre-season Mail Survey of Participating Landowners and Hunters	3
2004 Telephone Surveys.....	5
Why Did Some Landowners Decide Not to Participate?.....	5
Perceptions of Participating Landowners:	5
Perceptions of Participating Deer Hunters:.....	6
The Issue of Non-compliance with QDM harvest Standards:	6
2005 Post-season Mail Survey of Landowners.....	7
Interactions Landowners Associate With Impacts to be Managed:.....	7
Landowners' Preferences for Changes in Interactions:	12
Exploring How Trade-offs Among Impacts Influence Landowners' Preferences for Changes in Interactions:	13
Changes in Experienced and Desirable/Tolerable Levels of Impacts from 2002-05:	15
2005 Post-season Mail Survey of Deer Hunters.....	15
Interactions Associated with Naturalness of the Deer Population:.....	16
Interactions Associated with Fairness Among Hunters:.....	18
Changes in Experienced and Desirable/Tolerable Levels of Impacts from 2002-05:	19
Hunters' Willingness to Continue in the QDM Cooperative:.....	20
Conclusions and Implications	20
Literature Cited	22

LIST OF TABLES

Table 1. Context-specific interactions, effects, and impacts are context specific for landowners, based on a 2005 mail survey of landowners near King Ferry, NY.....	8
Table 2. Hypotheses about the relative weight of positive and negative impacts being traded-off by stakeholders when they consider their preferences for changes in an interaction such as “seeing deer.”	14
Table 3. Numbers of deer (by sex and age) that were observed, perceived as potential targets, shot at, and harvested during the regular firearms season by deer hunters participating in a quality deer management (QDM) initiative near King Ferry, NY during the 2004 hunting season, from 2005 mail survey.	17

LIST OF FIGURES

Figure 1. Relationship between perceived hunter noncompliance with quality deer management (QDM) and level of fairness among hunters, from a 2002 mail survey of hunters near King Ferry, NY.	7
Figure 2. Location-specific effects and impacts of the landowner-deer interaction “seeing deer,” from a 2005 mail survey of landowners near King Ferry, NY.	10
Figure 3. Location-specific effects and impacts associated with the landowner-deer interaction “seeing deer,” from a 2005 mail survey of landowners near King Ferry, NY.	11
Figure 4. Context and experience of “deer death anxiety” for landowners, from a 2005 mail survey of landowners near King Ferry, NY.	12
Figure 5. Changes in experienced (dashed lines) and tolerable levels (solid lines) of two negative impacts identified by landowners participating in a quality deer management cooperative near King Ferry, NY, based on mail surveys conducted in 2002 and 2005.	15
Figure 6. Changes in experienced (dashed lines) and tolerable level (solid lines) of “anxiety about being injured by other hunters shooting indiscriminately at deer” for deer hunters near King Ferry, NY, based on mail surveys conducted with the same individuals in 2002 and 2005.	19
Figure 7. Changes in experienced (dashed lines) and desirable levels (solid lines) of three positive impacts identified by deer hunters near King Ferry, NY, based on mail surveys conducted in 2002 and 2005 with the same individuals.	20

INTRODUCTION

Background About The QDM Cooperative at King Ferry

In November 2000, deer managers with the New York State Department of Environmental Conservation (DEC) met with landowners and deer hunters within a 16,000ac area in the vicinity of King Ferry, NY with the idea of establishing a quality deer management (QDM) cooperative as an incentive for greater deer harvest, and therefore a means of reducing concerns about crop damage and deer-related vehicle accidents and improving the deer sex ratio and buck age structure. Many landowners and hunters who typically hunted deer on those properties initially embraced the idea of QDM at that time, but decided to establish at a later date the specific harvest criteria that would be applied through QDM. DEC asked staff with the Human Dimensions Research Unit (HDRU) at Cornell University to evaluate this case of QDM as it was being applied at King Ferry in May 2001. By August 2001, DEC decided that enough landowners and hunters wanted to participate that the QDM initiative should be implemented for the upcoming hunting season. In October 2001, landowners and hunters decided to establish voluntary antler restrictions and voluntary emphasis on harvesting more antlerless deer.

The General Idea of QDM

QDM is a general concept and management approach to deer harvest for the purpose of ensuring that a deer population is in-line with local habitat conditions, and that the age and sex ratio of deer more closely reflects a natural condition than typically results from conventional deer management (Woods et al. 1996, Collier and Kremetz 2006). As applied to this cooperative, QDM was a voluntary intervention, supported in principal, but not regulated by DEC. Landowners and hunters participating in the cooperative debated the ideas of antler restriction and additional antlerless harvest. They adopted a voluntary buck harvest standard in which antlers must be wider than the ears when viewed from the front, or the main beam must extend in front of the eye when viewed from the side. Hunters also would be encouraged to make additional, voluntary effort to harvest antlerless deer, but quotas of doe harvest were not required for hunters to be eligible to harvest a buck meeting the QDM standard.

The Intervention: Application of QDM Harvest Standards on the Cooperative

Several research questions formed the basis of joint HDRU-DEC efforts to collect baseline information from participants (Enck et al. 2003): (1) What fundamental objectives do the stakeholders want to be achieved through changes in these deer population characteristics? (2) Could the desired changes be accomplished voluntarily or would a mandatory approach be needed? (3) Why do the desired characteristics not occur under conventional deer management (CDM)? (4) What is the system of hunter-deer and hunter-hunter interactions that affect harvest-related outcomes of the deer management system and (5) Could this system be managed in some way other than through regulations?

Conceptual Foundation for the Evaluation

The evaluation was based on the dual concepts of wildlife stakeholder acceptance capacity (WSAC; Decker and Purdy 1988, Carpenter et al. 2000) and adaptive impacts

management (AIM; Riley et al. 2002). WSAC posits that the capacity of stakeholders to accept the presence of a particular wildlife species is influenced by the interplay of their tolerance of negative impacts and their desire for positive impacts associated with that wildlife species, modified by characteristics of the stakeholder groups and the contexts in which the species-related impacts occur (Lischka et al. 2008). The main premise of AIM is that management success depends on identifying impacts to be managed at desirable (for positive impacts) or tolerable (for negative impacts) levels (Riley et al. 2003, Enck et al. 2006). Stakeholders' conceptualizations of the system producing human-wildlife interactions can be thought of as the *management system* to be influenced through some kind of intervention – in this case, QDM as described above.

A key to understanding effective intervention in a management system is to identify or determine how interactions among components of the system yield particular outcomes, whether they are ecological, recreational, economic, psychological, or pertain to health and safety. Some outcomes go unrecognized. Others are recognized, but not very important. Still other outcomes (either positive or negative) are considered by stakeholders to be important *impacts to be managed*. Stakeholder satisfaction and acceptance of management should be highest when these impacts are the *focus of management* (i.e., when fundamental objectives are defined in terms of impacts). Fundamental objectives often can be articulated as minimum desirable levels for positive impacts, and maximum tolerable levels for negative impacts (Riley et al. 2003). This provides a basis for evaluation.

Study Objectives

1. Evaluate the idea of quality deer management (QDM) in a particular geographic area.
2. Synthesize results and insights from this evaluation that pertain to the application of adaptive impact management (AIM).

METHODS

We first worked with landowners and hunters to develop a description of the management system, including major interactions, positive and negative impacts to be managed, and feed-back loops within the system. These were depicted in a concept map. Identification of impacts to be managed required considerable effort. Stakeholders' thinking needed to evolve from general, "fuzzy" descriptions of what and why they wanted or did not want particular outcomes from QDM interventions to more specific impacts (outcomes) desired. Assisting stakeholders to develop and refine their conceptions of the management system allowed us to assess why QDM might, or might not, address the impacts of interest to them.

In the fall of 2001 and periodically thereafter, DEC and HDRU held meetings with large groups (i.e., 25-40 people) of potential and active participants to identify their motivations for participating and their concerns about QDM. Additionally, 12 smaller-group meetings of 4-8 deer hunters were held to understand how they conceptualized the deer management system, and why they believed a QDM approach to deer management would be better than conventional regulations. One small-group meeting was held with 5 participating landowners in June 2002.

Using insights gained through these meetings, HDRU conducted a pre-hunting season mail survey of participants in early fall 2002. We conducted telephone surveys in October 2004 prior to deer season with 27 of the 36 originally-participating landowners and 54 deer hunters who could be reached. We also conducted telephone interviews with 19 non-participating landowners to assess reasons for their lack of participation. We implemented our final mail survey with participants in early 2005. That survey included a set of questions developed collaboratively with researchers from Michigan State University (MSU) to identify specific impacts to be managed and whether those impacts were within desirable/tolerable levels. Collaboration with MSU staff was part of a multi-state project¹ assessing the influence of landscape-level variables on landowner and hunter behaviors and attitudes towards deer (Lischka et al. 2008).

The longitudinal design of the evaluation allowed us to assess real changes (not inferred through statistical tests) in the beliefs, attitudes, and behaviors of individual participants over time. This made possible a powerful analysis of the QDM intervention despite the relatively small number of participants.

SYNTHESIS OF RESULTS AND DISCUSSION

This longitudinal case-study provided DEC with an opportunity to identify and manage fundamental ends, or impacts, of greatest importance to both landowners and deer hunters within the context of a QDM cooperative. In addition, we gained insights about a process that is useful for identifying those impacts, and for enhancing social learning opportunities within and among groups of stakeholders. We found that the social learning that occurred among individuals involved in the small-group process did not get transferred to the broader group. Furthermore, we found that improved understanding does not always translate into a change in behavior.

Insights from the small-group discussions were shared at an open meeting for all participating landowners and hunters in September 2002. The intention was to have the broader groups of landowners and hunters use the results to improve the suite of QDM "rules" to be included in the management intervention. Despite the general sense of participants at the meeting that "something had to be done" to lower perceive non-compliance, no changes were made in the QDM rules. Similar pre-season meetings were held in 2003, 2004, and 2005; no changes in the QDM rules were made at any of those meetings. Landowners consistently were unwilling to take on additional responsibility for recording deer harvested on their properties or using the threat of noncompliant hunters losing access privileges as a disincentive for shooting a buck not meeting the agreed-upon antler standard. Hunters, too, were reluctant to impose rules "with teeth." Apparently, imposing stronger "rule" was viewed as giving greater advantage to hunters who would ignore them.

2002 Pre-season Mail Survey of Participating Landowners and Hunters

In October 2002, we conducted a mail survey of all landowners and deer hunters known to be participating in the QDM cooperative. This survey verified that hunters and landowners

¹ Multi-state Hatch grant NC-1005 coordinated through state-level Agriculture Experiment Stations.

wanted to participate in the QDM cooperative because they believed QDM would change the characteristics of the deer population, which would increase or maintain high levels of positive deer-related impacts, and decrease or maintain low levels of negative impacts. In particular, many hunters greatly valued these positive impacts: (1) friendships with landowners, (2) healthy individual deer, (3) a sense of fairness among hunters, and (4) naturalness in the deer population. On the other hand, many hunters also were very concerned about being injured by other hunters indiscriminately shooting at deer. Landowners were most concerned about these negative impacts: (1) frustration about the persistent risk of crop damage, (2) risk of injury from a deer-vehicle accident, and (3) risk of excessive cost from a deer-vehicle accident. Participants believed that desirable or tolerable levels of these impacts had not been achieved under conventional deer management.

That first mail survey also verified participants' assumptions that desirable or tolerable levels of impacts "automatically" would be achieved if QDM successfully changed deer population characteristics in ways they expected (i.e., overall fewer deer, more balanced deer sex ratio, improved age structure among bucks). We found some differences in assumptions between those who greatly valued these outcomes as impacts to be managed (high-importance groups) compared to those who recognized that these outcomes might occur through QDM but placed less importance on them (low-importance groups). In particular, those in the low-importance groups tended to over-estimate the benefit of switching to QDM from CDM. Among hunters in the high-importance groups, we found higher levels of uncertainty and/or disagreement about whether various impacts would be more likely under QDM vs. CDM.

We found other areas of disagreement between high-importance and low-importance groups with respect to current (i.e., experienced) levels of impacts and desired/acceptable (i.e., possible objective) levels. Respondents in the high-importance groups indicated that current levels of positive impacts fell short of objective levels they desired, and current levels of negative impacts exceeded tolerable levels. Respondents in the low-importance groups thought current levels of positive impacts were below desirable levels, and they underestimated the levels desired by those in the high-importance groups. Also, those in low-importance groups generally thought that current levels of negative impacts were below maximum tolerable levels.

Results of the 2002 mail survey were shared at an open meeting of participants in September 2003. At that meeting, landowners and hunters again decided not to change how QDM was being implemented at King Ferry. The consensus of the group was that it might take "a couple years" before desired outcomes were noticed. DEC and HDRU staff decided not to re-survey participants in 2003.

Another open meeting was held with participants in September 2004. By that time, DEC staff had conducted several spot-light surveys in an effort to estimate the deer sex ratio and the buck age ratio. HDRU staff also had developed by then a conceptual model of several possible factors affecting hunters' willingness to pass-up shots at younger bucks (i.e., comply with the QDM rules). Discussion at the meeting revolved around the DEC deer population data and the face validity of the HDRU models. Based in part on disagreement among the meeting participants about the validity of both the DEC data and HDRU models, we decided to conduct a telephone survey of all known participants to assess the data and model validity and to collect

additional data to help us refine our conceptual models. We also decided to survey non-participating landowners to determine why they were not participating.

2004 Telephone Surveys

Why Did Some Landowners Decide Not to Participate?

We completed interviews with 19 of the 26 non-participating landowners within the overall footprint of the QDM area. Eleven of these 19 said their most important deer management issue involved negative impacts from deer. Seven said their most important issue was conflict with deer hunters, and the other said it was conflict with other landowners over deer management considerations. The landowner or close family members hunted deer on 7 of the 19 properties.

Eleven of the 19 did not want to enroll in QDM. Of these, 1 did not know enough about QDM to enroll, 3 did not think QDM would address their deer-related concerns, and 4 said the people who hunted deer on their property did not want them to enroll. The others mentioned additional, unsolicited reasons for not wanting to enroll were: “my property is too small,” “this is the only place I have to hunt and don’t want anyone else on it,” “I don’t like the DEC,” “I am not a hunter,” and “I don’t think QDM will reduce the deer population.”

Perceptions of Participating Landowners:

The telephone survey determined that participating landowners were split about whether the QDM intervention was resulting in the kinds of outcomes they wanted, with 44% reporting that the intervention was successful to \leq a slight extent and 41% reporting that it was working to \geq a moderate extent (15% said they were not sure). The vast majority of landowners who believed QDM was not successful reported increases in (1) the number of deer they saw (i.e., their estimate of the deer population), (2) crop damage, (3) deer-related vehicle accidents, and (4) damage to tree regeneration in woodlots. A plurality of those who assessed QDM as working to at least a moderate extent still reported no changes in the same factors.

We developed several hypotheses about why some landowners said QDM was working although they perceived none of the desired changes were occurring:

- Landowners may have revised their initial assumptions about whether negative impacts would decrease under QDM.
- Landowners may have learned that the negative impacts they wanted reduced were not as strongly linked to deer population size as they had initially thought.
- Landowners may have perceived that QDM was improving levels of positive impacts that “out-weighted” the lack of improvement in negative impacts.

- Landowners may weight an impact differently depending on whether they are assessing success from the context of being a farmer vs. a hunter.

We had no data to examine these hypotheses. We note, however, that even though some landowners evaluated QDM as not very successful, and most believed that QDM was not yet achieving outcomes they desired, 78% still were willing to continue participating in QDM for the 2004 hunting season.

Perceptions of Participating Deer Hunters:

Unlike landowners, most deer hunters (68%) in 2004 believed QDM was successful to at least “a moderate extent” (20% said, “a great extent”). Most hunters believed the total number of older bucks meeting the QDM buck harvest standards had increased during 2001-04 (70%) and that the ratio of older bucks to yearling bucks had increased (59%). Opinions differed about whether the doe to buck ratio had decreased as desired (22%), not changed (46%), or increased (31%). Hunters who believed QDM was successful to at least “a moderate extent” generally indicated an increase in positive hunter-deer interactions in the QDM area during 2001-04, whereas hunters believing QDM was less successful generally expressed mixed opinions. No single factor seemed to underlie hunters’ evaluations of QDM as not very successful. The vast majority of hunters (93%) were willing to continue participating in the QDM cooperative for the 2004 hunting season; 74% said they were “very willing.”

The Issue of Non-compliance with QDM harvest Standards:

More hunters perceived an improving (50%) vs. worsening trend (13%) from 2001-03 in the proportion of hunters complying with the QDM buck harvest standard. Nearly one-fourth (24%) believed there had been no change in compliance, and another 13% said they were unsure. Those who believed compliance had improved estimated a median non-compliance rate of 10% (the maximum tolerable rate determined from the 2002 survey). Among those who thought compliance had not changed, the median estimate of non-compliance was 30%. The median estimated non-compliance rate was 50% among those who believed compliance had worsened. In 2002, the median estimate of non-compliance had been 20% (Enck et al. 2003).

Perceived rate of non-compliance with QDM regulations was found in the 2002 survey to have a large influence on sense of fairness among hunters (Figure 1). A “tipping point” seems to exist between 7-12% non-compliance; i.e., when about one out of 10 hunters are thought to be “cheating” by shooting at bucks that do not meet the QDM standards. “Sense of fairness” among hunters drops quickly from just less than “complete fairness” at 5% non-compliance to something akin to “slight fairness” at about 18% non-compliance. Sense of fairness continues to erode as non-compliance rises above 18%, but at a much slower rate of decline.

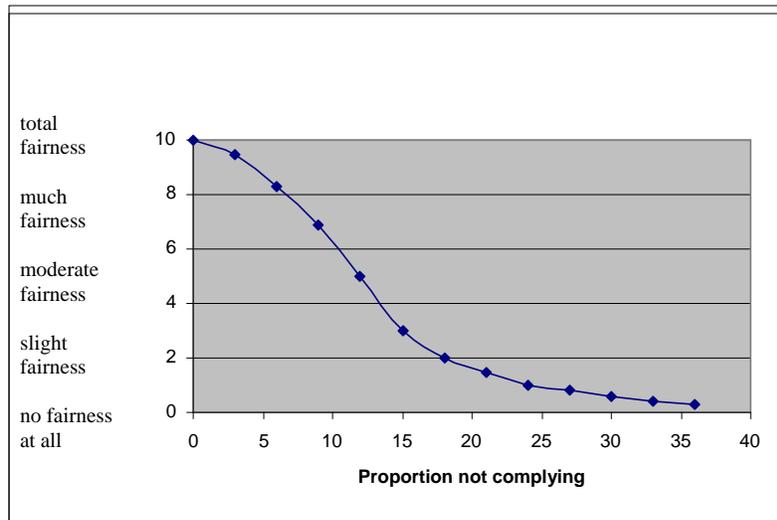


Figure 1. Relationship between perceived hunter noncompliance with quality deer management (QDM) and level of fairness among hunters, from a 2002 mail survey of hunters near King Ferry, NY.

2005 Post-season Mail Survey of Landowners

We developed an initial set of landowner-identified impacts during the first large-group meeting in 2001, and refined these in a small-group model-building exercise in June 2002. We refined this set of impacts further using results of the 2002 mail survey and 2004 telephone survey. Despite these efforts, it still was unclear how landowners' perceptions of those impacts were linked to changes they wanted in their interactions with deer and hunters. We believed that better understanding those linkages could lead to an improved QDM intervention. We developed the 2005 survey to determine those linkages.

Interactions Landowners Associate With Impacts to be Managed:

Our previous research indicated that location-specific context may influence landowners' association of impacts with interactions. To explore this phenomenon further, we analyzed landowners' reactions to observing deer in different situations. We examined 3 contexts of "seeing deer": (1) seeing live deer around home, (2) seeing live deer in their crop fields, and (3) seeing live deer along local roads. We also examined effects of seeing deer hunters on their property. We were interested in two questions:

- What effects do landowners associate with "seeing deer" or "seeing hunters" in the various contexts?
- Which of these effects do landowners value highly enough (either positively or negatively) for those effects to be impacts to be managed?

Most landowners associate several effects with “seeing deer” regardless of the context, and many of these effects are important enough to be considered the foci of management (Table 1). “Seeing deer” contributes to both positive and negative impacts for landowners when those deer are seen either around home or in crop fields. Landowners associate negative impacts with seeing live deer along local roads, but our data are inadequate to determine whether landowners associate any positive impacts with seeing live deer in that context.

Table 1. Context-specific interactions, effects, and impacts are context specific for landowners, based on a 2005 mail survey of landowners near King Ferry, NY.

<u>Landowner-deer interaction</u>	<u>Possible effects that might be associated with interaction</u>	<u>% recognized this effect</u>	<u>% for whom this is an impact</u>
“Seeing live deer” around home	Feel connected to nature	85	38
	Worry about cost of repairs from a deer-related vehicle accident (DRVA)	79	71
	Worry about being injured in DRVA	79	64
	Worry about hassle of dealing with DRVA	79	64
	Confident that hunting will be good	64	43
	Worry about cost of replacing plants	47	27
	Frustrated about wasting time replanting plants	47	20
	Worry about CWD	36	29
	“Seeing live deer” in my crop fields	Feel deer are healthy, well-fed	86
Confident that hunting will be good		85	46
Worry about cost of repairs from DRVA		79	71
Worry about being injured in DRVA		79	64
Worry about hassle of dealing with DRVA		79	64
Feel like a steward of nature		79	57
Feel connected to nature		71	36
Feel like property can support many deer		67	36
Worry about lost income from crop damage from deer		53	36

(continued on next page)

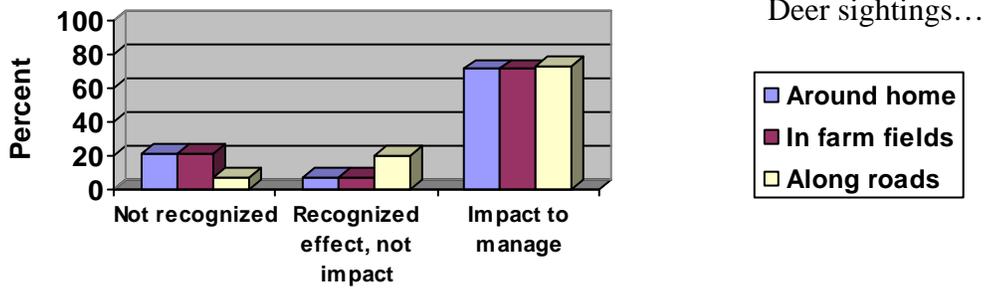
Table 1. Continued.

<u>Landowner-hunter interaction</u>	<u>Possible effects that might be associated with interaction</u>	<u>% recognized this effect</u>	<u>% for whom this is an impact</u>
“Seeing live deer” along local roads	Worry about cost of repairs from DRVA	93	73
	Worry about being injured in DRVA	93	67
	Worry about hassle of dealing with DRVA	93	67
	Anxiety about a deer dying in a DRVA	43	14
	Feel connected to nature	29	14
“Seeing hunters” on my property	Worry someone may trespass	79	57
	Confident that the population can sustain hunting	64	33
	Worry about being injured by hunters shooting unsafely	50	29
	Worry that other hunters will interfere with my hunting	43	21
	Anxiety about a deer dying from hunting	7	7

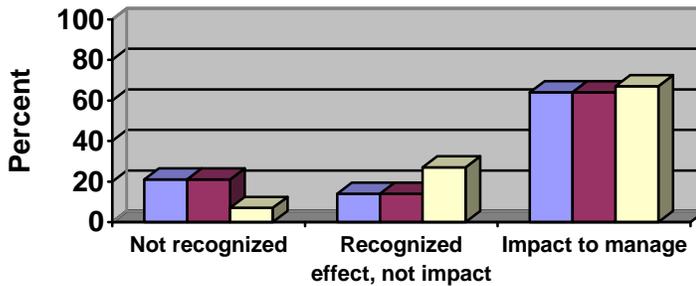
Negative effects associated with “seeing deer” were consistent regardless of location of the sightings. For example, concerns about deer-vehicle accidents were held by large majorities regardless of whether deer were seen around home, in nearby farm fields, or along roads (Figure 2; columns of the same color sum to 100%). Landowners reported that the mere possibility of having a DRVA gives rise to anxiety about multiple negative impacts.

On the other hand, positive effects associated with deer sightings seem to vary depending on context (Figure 3; columns of the same color sum to 100%). For example, feeling connected to nature is recognized as an effect of seeing deer around home and in farm fields by the vast majority of landowners, but feeling connected to nature generally is not associated with seeing live deer near a road. Feeling confident that deer hunting will be good is a positive impact for similar percentages of landowners regardless of whether they see deer around their homes or in their crop fields, but location of sightings does influence whether landowners even associate this effect with seeing deer. That is, seeing deer in crop fields is more often associated with the prospects for deer hunting than seeing deer around homes.

DRVA cost anxiety



DRVA injury anxiety



DRVA hassle anxiety

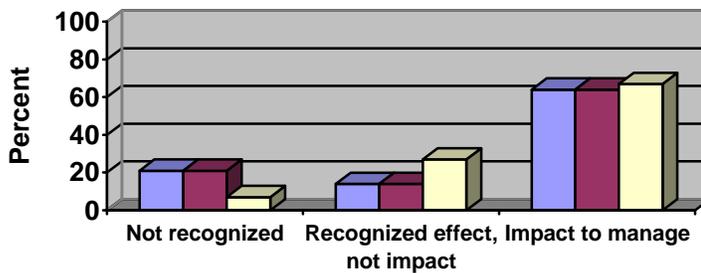


Figure 2. Location-specific effects and impacts of the landowner-deer interaction “seeing deer,” from a 2005 mail survey of landowners near King Ferry, NY.

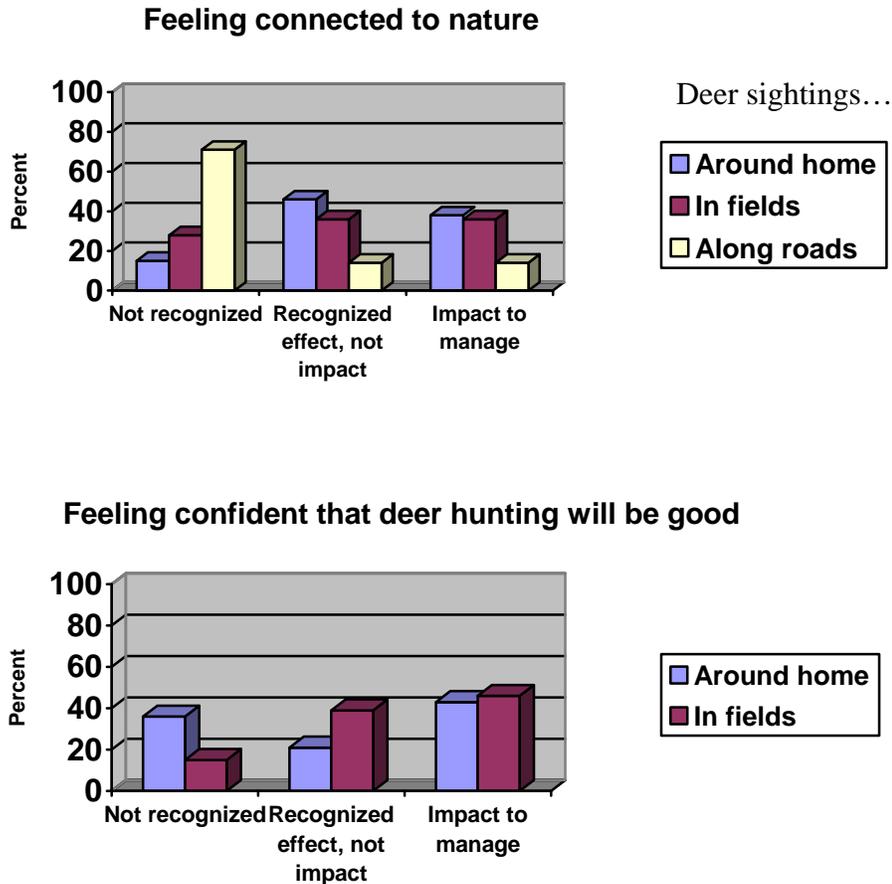


Figure 3. Location-specific effects and impacts associated with the landowner-deer interaction “seeing deer,” from a 2005 mail survey of landowners near King Ferry, NY.

Other attributes of context in addition to location were related to whether landowners experienced particular effects, and whether those effects were sufficiently important to be impacts to manage. For example, deer may be killed either in the context of DRVAs or hunting. Someone may worry that a deer may die in either context – particularly if they are concerned about the fate of individual deer. More landowners recognized a negative effect (“deer death anxiety”) when they saw live deer along roads compared to when they saw deer hunters during the hunting season (Figure 4; columns of the same color sum to 100%). In neither situation did many landowners indicate that this anxiety should be a focus of management.

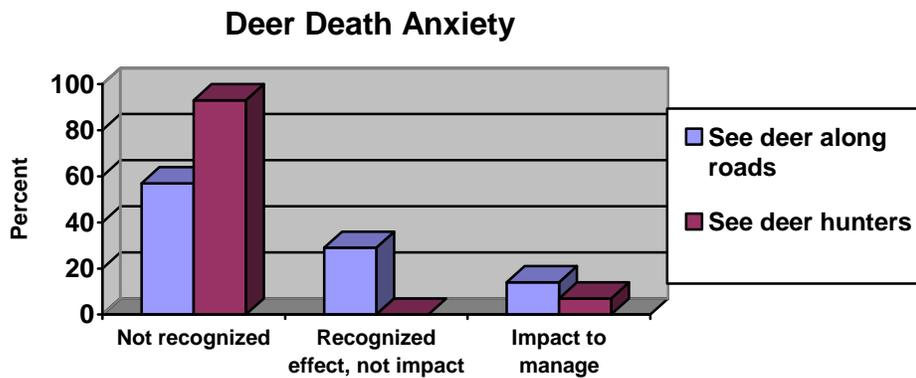


Figure 4. Context and experience of “deer death anxiety” for landowners, from a 2005 mail survey of landowners near King Ferry, NY.

Landowners’ Preferences for Changes in Interactions:

Not surprisingly, the more concern landowners placed on particular effects of seeing deer around home, the more likely they were to prefer decreases in both the negative effects and the contributing interaction. For example, about 70% of landowners identified 3 negative impacts from seeing deer (regardless of whether the context was around home, in their crop fields, or along roads): (1) anxiety about the cost of DRVA repairs, (2) anxiety about being personally injured in a DRVA, and (3) anxiety about the hassle of having to deal with a DRVA. Those landowners preferred a decrease in the contributing interaction – “seeing deer” – suggesting that in aggregate those negative impacts were above tolerable levels. On the other hand, the vast majority of landowners who did not consider these 3 effects to be impacts to manage preferred no change in the number of deer in the area or in their sightings of deer.

Similarly, about 25% of landowners associated 2 other negative impacts with seeing deer around their homes: (1) worry about the cost of replacing ornamental plants, and (2) frustration with the wasted effort of planting ornamentals. Most of these landowners preferred to see fewer deer. Landowners who did not consider these effects (worry, frustration) to be impacts were split about whether they preferred to see fewer or the same number of deer.

Despite most landowners associating positive impacts with deer sightings, those landowners preferred a decrease in “seeing deer” interactions. For example, many landowners reported that the interaction “seeing deer around home” contributed to experiencing 2 positive impacts: (1) feeling connected to nature, and (2) being confident that deer hunting will be good. Yet, most landowners who reported these positive impacts preferred to see fewer deer. This finding suggests that landowners make trade-offs between (i.e., place different weight on) positive and negative impacts when deciding on their preferences for changes in contributing interactions.

Exploring How Trade-offs Among Impacts Influence Landowners' Preferences for Changes in Interactions:

Considering that landowners' associate multiple impacts (both negative and positive) with a particular interaction, we wanted to understand the trade-offs among these impacts when developing preferences for future changes in that interaction. Nearly all participating landowners enrolled in the QDM cooperative because they preferred a lower deer population overall (Enck et al. 2003), and preferred to see fewer deer around their homes, in their crop fields, and along local roads (2005 survey data). Nevertheless, landowners also reported experiencing positive impacts from seeing deer as noted above. They undoubtedly make trade-offs when stating preferences for management that would reduce both the positive and negative impacts.

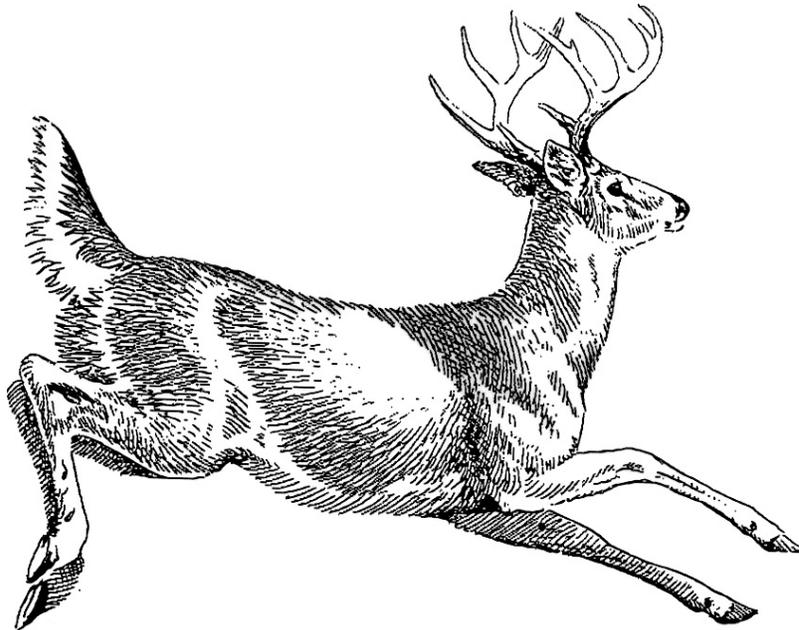
Hypothetically, these trade-offs likely involve differential weighting of positive and negative impacts by the landowners. Whether positive or negative impacts are weighted more heavily likely depends on landowners' perceptions of the relationship between experienced levels of the impacts and desirable/tolerable levels. The most informative scenario with respect to the weighting of positive and negative impacts would be when experienced levels of positive impacts are below desirable levels and experienced levels of negative impacts are above tolerable levels. Only under this scenario would landowners' preference for changes in the contributing interaction reveal the weighting they use in making trade-offs (Table 2). Negative impacts would be found to carry more weight if landowners prefer a decrease in the contributing interaction. Alternatively, positive interactions would be found to carry more weight if landowners prefer an increase in the interaction. A scenario in which landowners are uncertain about their preference for a change in the contributing interaction would reveal equal weighting of positive and negative impacts.

We lack sufficient data to examine these hypothesized relationships. Nonetheless, our data suggest that negative impacts may carry more weight than positive impacts for landowners in the King Ferry QDM cooperative vis-à-vis their preferences for changes in the deer-related interactions that contribute to those impacts. For example, landowners who reported intolerable levels of frustration about crop damage also preferred a decrease in seeing deer (around home and in crop fields), regardless of whether positive impacts were below desirable levels.

When landowners express preferences for changes in any particular interaction, they consider impacts associated with other interactions. This was revealed in our examination of factors affecting landowners' willingness to allow hunters access to their property. Landowners almost universally wanted to reduce the local deer population as a means for achieving more tolerable levels of several negative impacts. Nevertheless, 60% said they are not willing to allow any strangers to have access, in large part, because they believed other, collateral impacts would occur (e.g., interference with farming activities, anxiety about being injured by hunters shooting indiscriminately at deer, etc.). This low willingness to allow access for hunting has important implications for efforts to maintain or decrease deer populations in WMUs that are at or above population targets. Our results highlight the need to identify and manage collateral impacts that influence access decisions by landowners, which in turn can limit deer harvest and result in more negative impacts.

Table 2. Hypotheses about the relative weight of positive and negative impacts being traded-off by stakeholders when they consider their preferences for changes in an interaction such as “seeing deer.”

Stakeholders’ assessment of experienced levels of impacts relative to desirable/tolerable levels	<u>Direction of change preferred in interaction...</u>		
	<u>Decrease</u>	<u>Increase</u>	<u>No change</u>
positive impacts are high enough, and negative impacts are low enough	neg > pos	pos > neg	same weight
positive impacts are high enough, and negative impacts are too high	neg > pos or same weight	pos > neg	pos > neg
positive impacts are too low, and negative impacts low enough	neg > pos	same weight or pos > neg	neg > pos
positive impacts are too low, and negative impacts are too high	neg > pos	pos > neg	same weight



Changes in Experienced and Desirable/Tolerable Levels of Impacts from 2002-05:

Both experienced and tolerable levels of two negative impacts identified by landowners changed between 2002 and 2005 (Figure 5). Frustration about losing income from crop damage by deer worsened from 2002-2005, resulting in decreasing tolerance for that frustration. On the other hand, landowners experienced decreasing anxiety about being injured by hunters shooting indiscriminately at deer, leading to an increase in the level of anxiety tolerated.

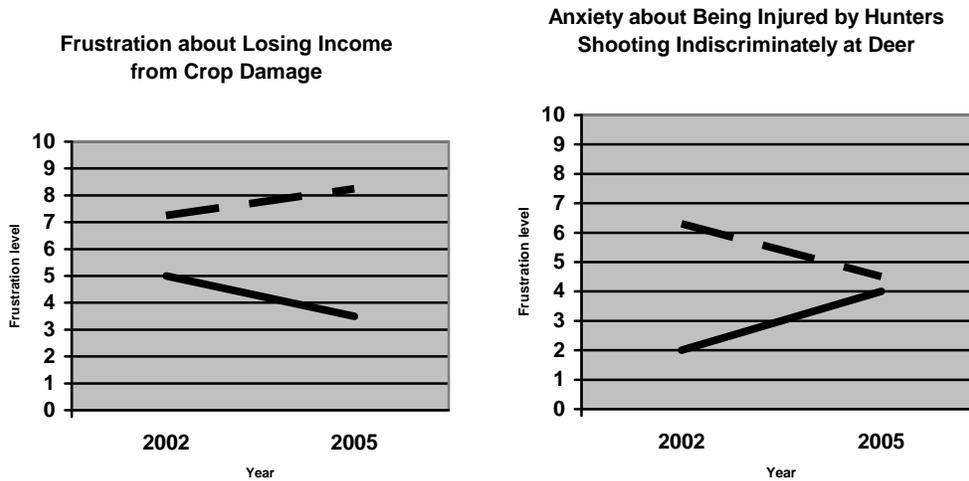


Figure 5. Changes in experienced (dashed lines) and tolerable levels (solid lines) of two negative impacts identified by landowners participating in a quality deer management cooperative near King Ferry, NY, based on mail surveys conducted in 2002 and 2005.

2005 Post-season Mail Survey of Deer Hunters

One of the main purposes of this survey was to monitor hunters' perceptions of levels of impacts that had been identified in the group meetings and verified in the 2002 mail survey (Enck et al. 2003) these impacts were: experiencing desirable level of naturalness in the deer sex ratio, experiencing desirable level of naturalness in the buck age ratio, experiencing a desirable level of fairness among all hunters, and experiencing a tolerable level of anxiety about being injured by other hunters shooting unsafely at deer. To interpret hunters' perceptions about levels of impacts, we also investigated their perceptions of changes in hunter-deer interactions with which they associated the impacts. These interactions included, seeing older bucks meeting QDM standards, seeing younger bucks not meeting QDM standards, seeing antlerless deer, and seeing/hearing other hunters.

Interactions Associated with Naturalness of the Deer Population:

Seeing antlered bucks. In 2005, one-half (50%) of the deer hunters believed that the number of antlered bucks meeting the QDM harvest standard on the area had increased since inception of QDM, and another 30% believed that the number of these mature bucks had remained about the same. Only 7% reported a decrease with the remaining 27% reporting uncertainty or no opinion. Similarly, about one-half (53%) reported a slight increase in the ratio of bucks meeting the QDM standard to smaller-antlered bucks on the area between 2002 and 2005, with 30% reporting no change in the buck age ratio and 13% being uncertain or having no opinion. A hunter-by-hunter comparison of perceptions from the 2002 and 2005 surveys revealed a slight improvement in the median buck age ratio in 2005 (ratio = 8 smaller, non-qualifying bucks to 2 larger, QDM-legal bucks) compared to 2002 (ratio = 9 smaller bucks to 1 QDM-legal buck). Overall, 40% of hunters who responded to both surveys believed the buck age ratio had not changed while 45% perceived a slight improvement. Trail-camera and spotlight surveys conducted by DEC indicated that the buck age structure did not change from 2001-2004 (DEC unpublished data).

Seeing antlerless deer. In 2005, hunters generally believed that the deer population on the QDM cooperative had an adult sex ratio skewed toward antlerless deer, with a median adult sex ratio of 80 antlerless deer and 20 antlered bucks out of every 100 deer. Hunters were split about whether the adult deer sex ratio had decreased as desired (30%; 27% said “slightly”), stayed the same (30%), or worsened (30%; 23% said “greatly”). The remaining 10% were uncertain or had no opinion. A hunter-by-hunter comparison of perceptions from the 2002 and 2005 surveys revealed that 75% of hunters had seen a higher ratio of adult antlerless deer to antlered bucks in 2005 compared to 2002. Trail-camera and spotlight surveys conducted by DEC indicated that the adult deer sex ratio did not change from 2001-2004 (DEC unpublished data).

Consistent with hunters’ perceptions of the adult deer sex ratio, they generally observed 3-4 times as many adult antlerless deer than antlered bucks per day during the regular firearms season (Table 3). Hunters also observed about 3 times as many smaller-antlered bucks not meeting the QDM harvest standard than QDM-legal bucks. Adult deer sex and buck age ratios based on these averages of observations are slightly better than the 4:1 ratios estimated by hunters, and reported above. Altogether, 31 deer hunters reported harvesting 10 antlerless deer and 3 QDM-legal bucks on the area in 2005. We have no independent verification of deer harvest in large part because participating hunters resisted the idea of having their deer recorded at a nearby DEC check station.

Based on hunters’ self-reports of the number of deer (by sex and age) at which they could have taken shots out of those they observed, smaller-antlered bucks were the most vulnerable to harvest and larger-antlered, QDM-legal bucks were the least vulnerable (Table 3). These data are consistent with harvest vulnerabilities of deer by age and sex determined in a recent statewide survey of deer hunters (Enck and Brown 2008a) and in a recent survey of hunters participating in a mandatory antler-restriction program in southeastern NY (Enck and Brown 2008b).

Table 3. Numbers of deer (by sex and age) that were observed, perceived as potential targets, shot at, and harvested during the regular firearms season by deer hunters participating in a quality deer management (QDM) initiative near King Ferry, NY during the 2004 hunting season, from 2005 mail survey.

<u>Hunter-deer interactions</u>	<u>Segment of the deer population by sex and age</u>		
	<u>Antlerless deer</u>	<u>Smaller-antlered bucks (sublegal)</u>	<u>Larger-antlered QDM-legal bucks</u>
Number seen during regular firearms season	23.4	5.4	1.7
Number seen per day during regular firearms season	4.9	0.9	0.3
index to harvest vulnerability (of seen, % that could have been shot at; hunter had tag, deer was in-range for safe shot)	51%	60%	31%
index to willingness to shoot (of those vulnerable, % shot at by hunter)	12%	4%	39%
index to shooting effectiveness (of those shot at by hunter, % harvested)	52%	0%	40%
index to shooting efficiency (total shots taken per deer harvested)	1.2	0.0	1.2
# harvested	0.3	0.0	0.1
% harvested 0	70.0	0.0	93.3
% harvested 1	30.0	0.0	3.3
% harvested 2	0.0	0.0	3.3

Similar to findings from these other studies, hunters participating in the QDM initiative reported a relatively low willingness to take shots at deer when they had the opportunity to do so (Table 3). The findings that hunters were willing to shoot at only 39% of bucks meeting the QDM harvest standard and only 12% of harvest-vulnerable antlerless deer are surprising. We have no additional data to help us understand the low willingness to harvest mature bucks, but these data are consistent with the finding from other areas that hunters are not willing to shoot at many of the larger-antlered bucks that present an opportunity for a shot (Enck and Brown 2008a, Enck and Brown 2008b).

The low willingness to harvest antlerless deer invalidates an important stated assumption from the outset of the QDM initiative. Most hunters had assumed that the decreased buck harvest opportunity stemming from the voluntary QDM harvest standard would lead hunters to increase harvest of antlerless deer (Enck et al. 2003). That anticipated, additive harvest seems not to have occurred, most likely because of the low willingness to shoot at antlerless deer, rather than particularly low vulnerability of those deer to harvest or particularly low shooting effectiveness on the part of hunters (Table 3).

The low willingness to take shots at antlerless deer demonstrated by hunters was not consistent with their stated level of willingness determined through the survey. When asked how willing they were to harvest an antlerless deer when they hold a valid deer management permit (DMP), 45% said they were “extremely willing” and another 33% said “very willing.” Hunters reported that “if my friends or I could use more venison,” or “if it seems enough does are surviving to produce a good crop of buck fawns next year,” then they were more willing to harvest an antlerless deer. The following factors all had much less influence on their willingness to harvest an antlerless deer: amount of prestige associated with taking a buck, scarcity of bucks relative to hunters, naturalness of the deer sex ratio, and whether a hunter already had filled a buck tag.

That hunters were willing to shoot at only 4% of smaller-antlered bucks that do not meet the QDM harvest standard suggests that an improvement in the buck age ratio is at least possible. When those same hunters hunted deer outside of the QDM cooperative, about one-half of them said they were either “extremely willing” (21%) or very willing (29%) to pass-up shots at small bucks. Seventeen percent were “moderately willing,” and 8% had no opinion about their willingness. The survey revealed that the two factors with the greatest influence on hunters’ willingness to pass-up shots at smaller bucks operate in different directions. If hunters think there are some mature bucks in the area, they are more willing pass-up shots at smaller bucks and to “hold-out” for a mature buck. Conversely, if they think antlered bucks are scarce relative to antlerless deer in the area, they are less willing to pass-up smaller bucks.

Interactions Associated with Fairness Among Hunters:

Issues of fairness among hunters, or the perceived lack of fairness, remain unresolved among participants and are manifested in perceptions of high levels of non-compliance with the QDM buck harvest standard on the area. In 2005, the median perceived level of non-compliance was 30%, even higher than the 25% median non-compliance rate perceived in 2002. When asked about changes in perceived compliance from 2002-2005, 37% said they thought more hunters were complying, 30% believed fewer hunters were complying, and 33% thought that about the same percentage were complying in 2005 as had been complying in 2002. A hunter-by-hunter comparison of those who responded in both 2002 and 2005 revealed improved estimates of compliance by 44% of hunters, but worse estimates of compliance for 56%.

Perceptions of non-compliance were associated with a variety of hunter-hunter interactions. More than one-half of hunters (57%) based their perceptions on what they overheard other hunters talking about, and nearly one-half (47%) said they based their perceptions of non-compliance on the behavior of their own hunting group (i.e., allowed young

hunters to take a small buck, someone made a mistake, etc.). Substantial percentages of hunters also based their perceptions on “all the shots I hear coming from adjacent properties” (40%), seeing other hunters with small bucks they have taken (37%), and based on knowledge that hunters put on deer drives on adjacent properties (23%).

Changes in Experienced and Desirable/Tolerable Levels of Impacts from 2002-05:

In both 2002 and 2005, we measured experienced and tolerable levels of four impacts: (1) anxiety about being injured by hunters shooting unsafely at deer, (2) sense of fairness among hunters, (3) feeling like an expert deer hunter, and (4) naturalness of the deer population [general “deer population” in 2002; specific “proportion of bucks compared to does” in 2005]. In 2002, anxiety about being injured by other hunters shooting unsafely at deer exceeded the level tolerable to hunters, but experienced anxiety was below the maximum level tolerable to hunters by 2005 (Figure 6). In the case of injury anxiety, the level tolerated by hunters increased concurrent with a decrease in experienced anxiety.

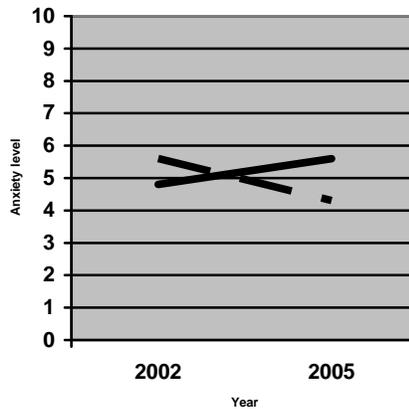


Figure 6. Changes in experienced (dashed lines) and tolerable level (solid lines) of “anxiety about being injured by other hunters shooting indiscriminately at deer” for deer hunters near King Ferry, NY, based on mail surveys conducted with the same individuals in 2002 and 2005.

In the case of “sense of fairness among hunters,” neither experienced nor desirable levels changed from 2002-2005 (Figure 7, left). Experienced levels of “fairness” were substantially below desirable levels both years. In the case of “naturalness of the buck age ratio,” both desirable and experienced levels decreased in parallel from 2002-2005 (Figure 7, center). Similar to “fairness,” “naturalness” was below desirable levels both years. In the case of “sense of expertness as a better-than-average deer hunter,” experienced level increased slightly from 2002-2005 whereas desirable level was constant (Figure 7, right). Experienced level was essentially at the minimum desirable level in 2002 and 2005.

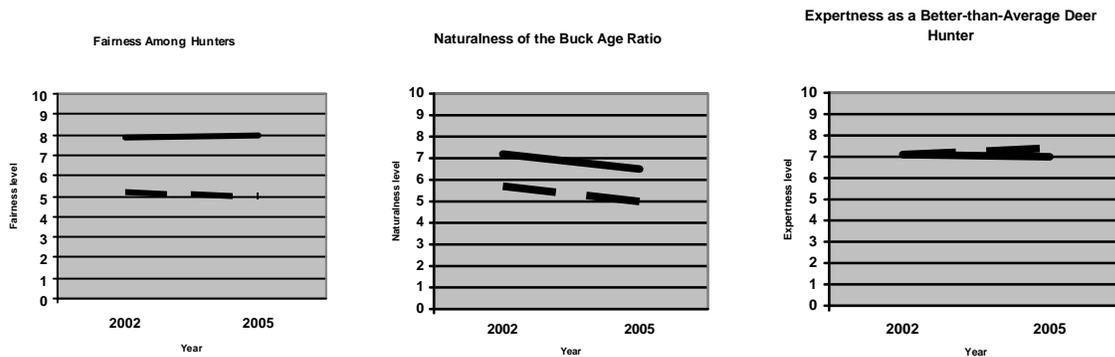


Figure 7. Changes in experienced (dashed lines) and desirable levels (solid lines) of three positive impacts identified by deer hunters near King Ferry, NY, based on mail surveys conducted in 2002 and 2005 with the same individuals.

Hunters' Willingness to Continue in the QDM Cooperative:

Given the comparison in the previous section of experienced vs. tolerable/desirable levels of impacts, we anticipated that few hunters would be willing to continue participating in the QDM cooperative. Many of the outcomes they sought when they chose to participate in 2001 were not yet met in 2005. Unexpectedly, more than one-half of deer hunters (52%) were “very willing” to continue, and another 23% were “moderately willing.” Sixteen percent of hunters were “slightly willing” whereas 6% were “not at all willing” to continue participating.

CONCLUSIONS AND IMPLICATIONS

This case study provided DEC with an opportunity to identify and manage fundamental ends, or impacts, of greatest importance to both landowners and deer hunters within the context of a QDM cooperative. In addition, we gained insights about a process that is useful for identifying those impacts, and for enhancing social learning opportunities within and among groups of stakeholders. We found that social learning that can occur among some individuals involved in a process does not easily get transferred to the broader group. Furthermore, we found that improved understanding does not always translate into a change in behavior.

Our evaluation revealed several important insights about QDM as applied in this case, and about trying to manage for desirable/tolerable levels of deer-related impacts through any deer management intervention. One insight was that negative impacts associated with seeing deer were consistent regardless of location where the observations occurred. For example, regardless of whether landowners saw deer around home, in their crop fields, or along local roads, such sightings led to anxiety about the possibility of having deer-vehicle accidents among large majorities of landowners. On the other hand, positive impacts seem to be more context-

specific. Most landowners recognize a sense of “feeling connected to nature” when they see deer around home or in their farm fields, but not when they see live deer near local roads.

Another insight supported by our data, but needing more research attention, is that negative impacts seem to carry more weight than positive impacts in landowners’ preferences for changes in the deer-related interactions that contribute to those impacts. For example, landowners who reported intolerable levels of frustration about crop damage also preferred a decrease in “seeing deer” interactions around home and in their crop fields, regardless of whether positive impacts associated with such sightings were at desirable levels or were too low.

Landowners also apparently consider collateral impacts when developing preferences for changes in deer-related interactions. Despite almost universal interest in reducing intolerable levels of several negative impacts, landowners’ concern about being injured by hunters shooting unsafely at deer or interfering with their own hunting experiences limited their willingness to provide access for more hunters on their properties. The low willingness to allow access for more hunters highlights a challenge for QDM or any other deer management intervention to be implemented effectively across large areas. These findings also highlight the importance of identifying and managing collateral impacts that may influence landowners’ behaviors.

A surprising finding was that a majority of both landowners and hunters were willing to continue participating in the QDM cooperative despite what they saw as lack of progress as manifested through the intolerable or undesirable levels of impacts they experienced to date. Although negative impacts have greater influence than positive impacts on preferences for changes in contributing interactions, positive impacts (experienced or expected) have more influence on their willingness to continue. Specifically, landowners’ and hunters’ beliefs that QDM will eventually result in desired outcomes seems to be a stronger motivation to continue participating than the lack of management success they have experienced is a cause to quit.

The QDM cooperative at King Ferry included landowners with a range of interests (some enthusiastic and some disinterested) in QDM. Deer hunters also varied in their interest in QDM. Some of the hunters typically having access to properties participating in the program wanted to engage in QDM, but others did not. Unlike DEC’s experiences elsewhere in which hunting clubs or single landowners asked for assistance establishing a QDM plant, in this situation the landowner and hunters who were interested in QDM could not agree on a galvanizing purpose and collective commitment to implement QDM consistently across properties.

LITERATURE CITED

- Carpenter, L. H., D. J. Decker, and J. F. Lipscomb. 2000. Stakeholder acceptance capacity in wildlife management. *Human Dimensions of Wildlife* 5:5-19.
- Collier, B. A. and D. G. Kremetz. 2006. White-tailed deer management practices on private lands in Arkansas. *Wildlife Society Bulletin* 34(2):307-313.
- DEC website. www.dec.ny.gov/outdoor/27663.html. (last accessed 9 February 2009).
- Enck, J. W. No date. Understanding hunter behavior on the King Ferry QDM cooperative. Human Dimensions Research Unit white paper. 26pp.
- Enck, J.W., T. L. Brown, and D. Riehlman. 2003. Landowner and hunter response to implementation of a Quality Deer Management (QDM) cooperative near King Ferry, New York. Human Dimensions Research Unit publication 03-7. Department of Natural Resources, Cornell University, Ithaca, NY. USA. 67pp.
- Enck, J.W., D. J. Decker, S. J. Riley, J. F. Organ, L. H. Carpenter, and W. F. Siemer. 2006. Integrating ecological and human dimensions in adaptive management of wildlife-related impacts. *Wildlife Society Bulletin* 34(3):698-705.
- Enck, J. W. and T. L. Brown. 2008a. 2007 statewide deer hunter survey: Participation during the '06 seasons, opinions about hot-button issues, and trends in characteristics of hunters. Human Dimensions Research Unit series publication 08-5. Department of Natural Resources, Cornell University, Ithaca, NY, USA.
- Enck, J. W. and T. L. Brown. 2008b. Deer hunters' assessment of antler restrictions in wildlife management units (WMUs) 3C, 3J, 3H, and 3K during the 2007 hunting season. Human Dimensions Research Unit series publication 08-7. Department of Natural Resources, Cornell University, Ithaca, NY, USA.
- Lischka, S. A., S. J. Riley, and B. A. Rudolph. 2008. Effects of impact perception on acceptance capacity for white-tailed deer. *Journal of Wildlife Management* 72(2):502-509.
- Ozaga, J. J. and L. J. Verme. 1985. Comparative breeding behavior and performance of yearling vs. prime-age white-tailed bucks. *Journal of Wildlife Management* 49:364-372.
- Riley, S. R., D. J. Decker, L. H. Carpenter, J. F. Organ, W. F. Siemer, G. F. Mattfeld, and G. Parsons. 2002. The essence of wildlife management. *Wildlife Society Bulletin* 30(2):585-593.
- Riley, S. R., W. F. Siemer, D. J. Decker, L. H. Carpenter, J. F. Organ, and L. T. Berchielli. 2003. Adaptive impact management: an integrative approach to wildlife management. *Human Dimensions of Wildlife* 8:81-95.

Schusler, T. M., D. J. Decker, and M. J. Pfeffer. 2003. Social learning for collaborative natural resource management. *Society and Natural Resources* 15:309-326.

Woods, G. R., D. C. Guynn, W. E. Hammitt, and M. E. Patterson. 1996. Determinants of participant satisfaction with quality deer management. *Wildlife Society Bulletin* 24(2):318-324.