Landowner Opinions about Moose in Northern New York State

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PUBLICATION SERIES

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EXECUTIVE SUMMARY

The New York State Department of Environmental Conservation (DEC), Bureau of Wildlife is responsible for the management of moose in New York State (NYS). DEC estimates that there are more than 400 moose living in the state, and it is currently in the process of developing a moose management plan. To inform their plan, DEC staff asked the Center for Conservation Social Sciences (CCSS) at Cornell University to undertake research to provide them with information on key stakeholders' attitudes, concerns and interests related to moose and their impacts, both now and in the future.

We focused on three stakeholder groups in a series of studies that make up this research project: (1) NYS residents (i.e., general public), (2) large private forestland owners and managers in northern New York, and (3) landowners in the core and peripheral moose ranges in New York. This report focuses on our findings from a mail survey with the third group. The results of the first two studies are reported in Connelly et al. (2019, 2020) and are included in a synthesis of findings at the end of this report.

We sent mail surveys to 2,800 landowners who owned property within the core moose range, defined by DEC as within the Adirondack Park, and 2,800 landowners who owned property within the peripheral moose range as defined by DEC. The questionnaire focused on awareness of and experience with moose, perceptions of benefits and concerns related to moose, support for management actions given various moose population scenarios, and socio-demographic characteristics. A 42% response rate was achieved.

Approximately half of the respondents (46-54%)[1] had seen a moose at some time in NYS. Two-thirds of respondents indicated their experiences with moose have been somewhat to very positive; less than 3% of respondents reported an overall negative experience.

We found that over 85% of respondents like knowing moose live in the state and would like people to have the opportunity to see them. A smaller (but still substantial) majority agreed that allowing hunting would be beneficial if the moose population becomes large enough, with 59-65% agreeing and 17-23% disagreeing.

Over half of the respondents were moderately or very concerned about the possibility of moose-vehicle collisions occurring in NYS. Very few (15-19%) were moderately or very concerned about moose damage to forests and plants in NYS.

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[1] Ranges indicate results from core and peripheral area landowners.

The majority of landowners enjoy moose and do not worry about the problems they may cause (57-66%). Almost no one regarded moose as a nuisance. Similarly, two-thirds of core area landowners and three-fifths of peripheral area landowners would like to see the moose population increase in the future; less than 2% wanted to see a decrease.

Trust in DEC's ability to manage moose was high, with 59-62% of landowners in the moose ranges agreeing that DEC understands the factors to consider when deciding how to manage moose and trusts DEC to make those decisions. Those who had a more conservative political leaning or had hunted in the past year were less likely than others to trust DEC. Trust in DEC was an important factor in explaining support for almost all possible management actions that could be undertaken in the future. This finding suggests that as management planning proceeds efforts taken by DEC to share considerations in management decisions might build trust and support for eventual management actions.

Given the current moose population or a hypothetical increased population in the future, landowners would generally support non-lethal actions to increase the benefits of having moose (e.g., promotion of moose viewing opportunities which might benefit the local economy) and address potential concerns (e.g., increased signage and reducing speed limits where moose-vehicle collisions might occur). If the moose population increased, in addition to general support for non-lethal actions, there would be increased support for lethal actions among landowners. Two-thirds or more of the landowners would support the establishment of a moose hunting season to manage moose numbers. Fewer respondents would support (50-58%) DEC issuing nuisance permits to shoot moose on properties with too much damage to young forests; one-quarter to one-third would oppose it. Having a better understanding of the reasons for the difference in support between the two lethal actions might be helpful before implementing either option.

If the moose population decreased in the future, the majority of landowners would support four of the five management actions we asked about (increased funding for research to better understand the decline, moving moose from areas where they are plentiful to areas with good habitat but fewer moose, encouraging landowners to improve moose habitat, and lessening restrictions on timber cutting practices on private land in the Adirondack Park, so more young forest can be created). The least supported (40-43%) and most opposed (30-32%) action was to reduce the number of deer in core moose habitat to reduce parasites that are spread to moose by deer. Opposition to this action was more likely among those who had hunted in the past year, suggesting concern for a potential loss of deer hunting opportunities.

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INTRODUCTION

The New York State Department of Environmental Conservation (DEC), Bureau of Wildlife is responsible for the management of moose in New York State (NYS). Moose are considered a Species of Greatest Conservation Need (NYSDEC 2015). They were extirpated from the state due to hunting and habitat loss in the late 1800s and returned a century later. DEC estimates that there are approximately 400 moose living in northern New York, mostly within the Adirondack Park.

DEC is in the process of developing a management plan for moose in the state. To inform their plan, they asked the Center for Conservation Social Sciences (CCSS) at Cornell University to undertake research to provide them with information on key stakeholders' attitudes, concerns and interests related to moose and their impacts, both now and in the future. We focused on three stakeholder groups in the series of studies that make up this research project: (1) NYS residents (i.e., general public), (2) large private forestland owners and managers in northern New York, and (3) landowners in the core and peripheral moose ranges in New York.

This report presents findings from our mail survey of the third group above: landowners in the core and peripheral moose ranges in New York. In the final sections of the report, we synthesize the results of our research with all three stakeholder groups and make some general conclusions and recommendations.

BACKGROUND

Like other state wildlife agencies, DEC identified and incorporated climate change as an important consideration in its State Wildlife Action Plan (NYSDEC 2015). Moose are facing numerous climate-related stresses and climate change has been implicated in population declines from Minnesota to Maine (e.g., Murray et al. 2006, Lenarz et al. 2010, Rines 2015).

While continued changes in climate conditions are projected, the magnitude of these changes, variability through the seasons, and ultimate impacts on moose and their habitat in different contexts are uncertain (e.g., Murray et al. 2012). Reflecting uncertainty about potential climate-related threats and how species will respond to those threats remains a challenge when making management decisions. State agencies have limited capacity to integrate information on climate threats and related stressors into management planning and consider long temporal scales (25-100 years) (Archie et al. 2012, Kretser et al. 2014, Rickards et al. 2014). In the face of these challenges, DEC is seeking the best way to consider potential climate impacts in management plans now, because opportunities to respond to climate change will become more limited as time goes on and ignoring it may result in harm to important resources (IPCC 2014).

In recent years DEC has engaged in several scenario planning workshops with researchers and conservation planners from the United States Geological Survey (USGS) and the Wildlife Conservation Society (WCS). This effort has been motivated by an interest in developing a moose management plan that considers the uncertainties related to future population dynamics, land use, and climate change impacts. The workshops were designed to develop an understanding of potential impacts of climate change on moose populations; identify needs for research to support development of a moose management plan; and articulate potential actions given possible futures for moose in NYS.

Our survey of landowners explored social perceptions of moose and the acceptance of specific moose management actions given uncertainties in exactly how the moose population will respond to future conditions. We anticipated that awareness of the uncertainties in how the moose population might change could alter respondents' willingness to accept management actions and, consequently, included an experiment in our survey where some respondents were given information about uncertainties in how the moose population might change while others were not.

Landowners living near moose habitat are the most likely to experience the benefits and negative impacts of moose, and, therefore, it is important to understand their experiences and views when formulating a management plan. DEC defined two moose ranges - core and peripheral, and we surveyed landowners who owned residences in these ranges. DEC defined the core range as the Adirondack Park. The peripheral moose range was defined as townships surrounding the Park and along the northeastern border of New York (Figure 1). The core range has an established moose population, while the peripheral range has moose habitat or occasional moose sightings. Therefore, residents in each range likely have different levels of experience with moose. DEC management actions may also differ by these ranges, most likely in monitoring approaches and metrics. Also, conflict mitigation might be required more frequently in the core range, and management strategies might differ because of the different land use regulations inside and outside the Adirondack Park.

Other factors that might influence support for moose management actions include perceptions of the benefits of having moose, concerns about potential negative impacts of moose, general environmental beliefs (as described by Stedman [2004] and Knight [2008]), and trust in DEC and scientists. A previous study of NYS hunters, anglers, and upstate residents (i.e., those living north of the New York City area) found a strong correlation between trust in DEC to make good decisions and the belief that DEC was making good decisions in regards to management of endangered species (Connelly et al. 2017). The study also found that respondents who thought it was very important to involve scientists when deciding what actions to take were more likely to believe DEC was making good decisions.
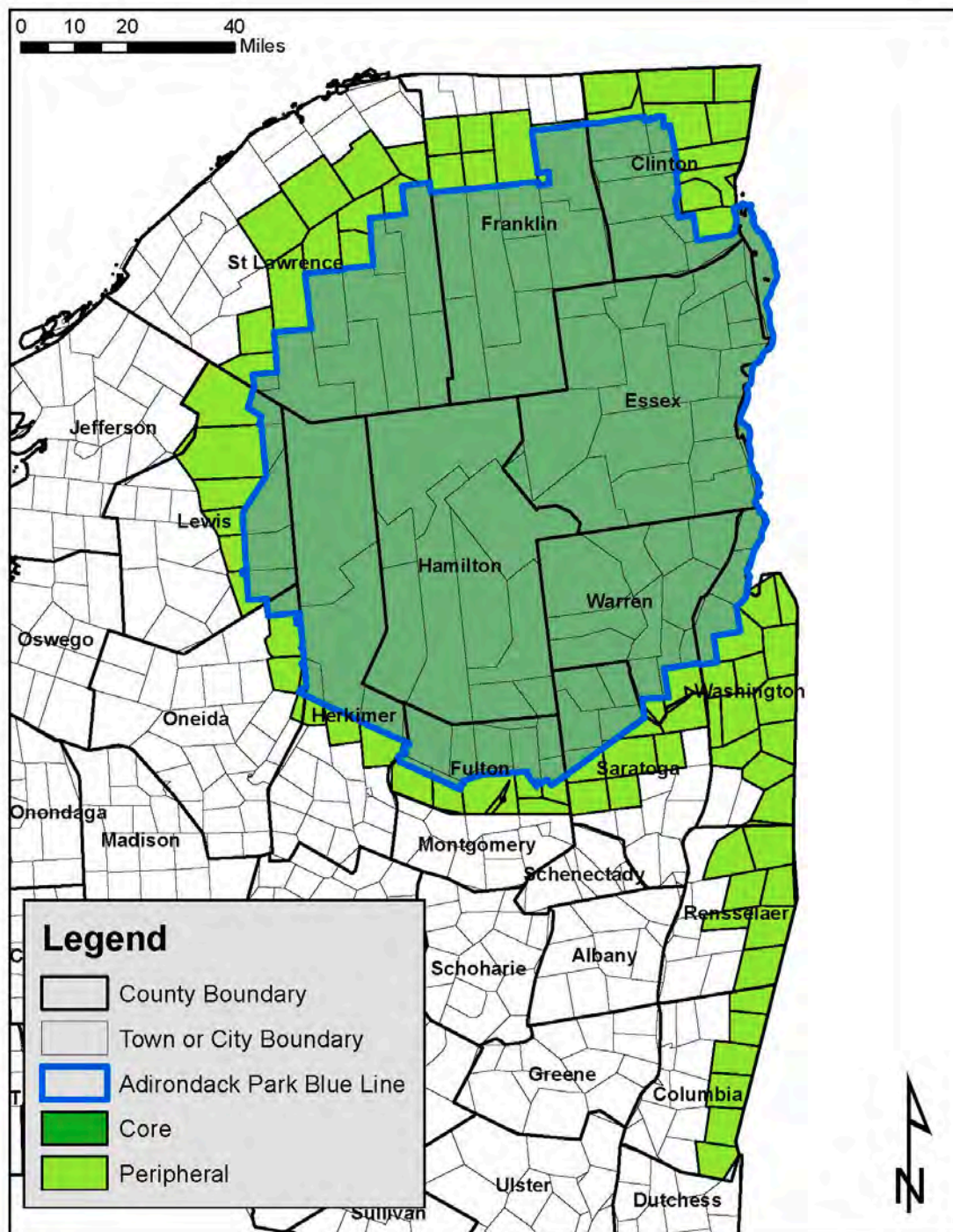
Figure 1. Towns in core and peripheral moose range from which NYS property owners were sampled.

Building on this foundation, the specific objectives for this study were:

1. Quantify awareness of moose presence in NY.
2. Document experiences with moose and understand how these experiences have been viewed—positively or negatively.
3. Assess the perceived importance of benefits associated with moose in NY.
4. Assess concern about negative moose-related impacts.
5. Identify the desire for population change.
6. Assess support for moose management options under hypothetical future moose population scenarios.
7. Examine the impact of scientific uncertainty and trust in the management agency on support for management actions.
8. Understand how the previous objectives vary by socio-demographic characteristics and geographic proximity.

METHODS

Sample Selection

We randomly sampled 2,800 landowners from property tax rolls who owned property within the core moose range, defined by DEC as within the Adirondack Park (Figure 1). We also sampled an additional 2,800 landowners who owned property within the peripheral moose range as defined by DEC. Only property types listed as "year-round residential" were included in the sample. Some of the mailing addresses of the landowners we sampled, however, differed from the addresses of the properties they owned within the study area, suggesting that they might only live in the residence seasonally.

Questionnaire Design

The questionnaire focused on awareness of and experience with moose, perceptions of benefits and concerns related to moose, support for management actions under various moose population scenarios, and socio-demographic characteristics. To test the potential impact of scientific uncertainty on support for management actions, we randomly divided the sample in half (within each moose range) and in half of the questionnaires included statements describing uncertainties about how the moose population could change under different scenarios. The other half of the questionnaires did not include these statements. The full text of the questionnaire with the uncertainty statements is available in Appendix A. The uncertainty statements, which include the text "scientists are unsure," are the last bullet points in Questions 11, 12, and 13.

Mail Survey Implementation

We implemented the mail survey starting on September 18, 2019. We sent up to three follow-up mailings, including another copy of the questionnaire, to non-respondents over the course of the next four weeks to encourage their response.

Non-respondent Telephone Follow-up

We implemented a telephone follow-up survey of 100 non-respondents (50 from the core range and 50 from the peripheral range) approximately two months after the first mailing of the questionnaire to understand how non-respondents differed from respondents. Key questions from the mail survey—awareness of and experience with moose, views on benefits and concerns related to moose, and the future moose population trend desired—were asked over the telephone. A copy of the telephone interview instrument can be found in Appendix B.

Analysis

We analyzed the data using SPSS (IBM SPSS Statistics 24). Pearson's chi-square test and t-tests were used to test for statistically significant differences between respondents and non-respondents, and landowners in the core and peripheral ranges at the $P < 0.05$ level. Scheffe's test was used to test for differences in means between more than three groups, such as for differences in education level.

We used principal component factor analysis with varimax rotation to group items into scales associated with: 1) benefits of moose, 2) concerns about moose, 3) trust in DEC, 4) environmental beliefs, and 5) potential management actions. The reliability of each of these scales was tested using Cronbach's alpha (α) for scales with three or more items and Spearman–Brown statistic (r_{sb}) for scales with two items. The items in scales of sufficient reliability were combined, by taking their average, into a single variable that was used in regression analysis.

Respondents' mailing addresses were geocoded using the SAM Street Number and Address Geocoding Service (NYS GIS Program Office), and determined to be in the core area, peripheral area, or outside these areas using ArcGIS software (ArcMap 10.3). A variable, called primary residence, was created indicating the location of the mailing address: 1) core area, peripheral area, outside the study area but within NYS, outside NYS. Also using ArcGIS software the properties of respondents who indicated they had seen a moose on their property were located on a map using information from the property tax records.

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We used regression analysis to identify factors explaining support for management actions under different moose population scenarios. Factors we considered in this analysis included experiences with moose, perceived benefits and concerns associated with moose, trust in the DEC and scientists, participation in outdoor recreation activities, socio-demographic characteristics, and geographic residence status (e.g., property in the core versus peripheral ranges; primary residence (mailing address) in the core range, peripheral range, or outside the study area).

RESULTS AND DISCUSSION

Survey Response

Of the 5,600 questionnaires mailed, 809 were undeliverable, and 1,989 completed questionnaires were returned, resulting in an overall adjusted response rate of 42%. Response rates differed significantly between the landowners in the core and peripheral moose ranges, with those in the core range responding at a higher rate (46% vs 37%) (Table 1). No statistically significant difference was found in response rates between those receiving the slightly longer questionnaire (3% more words) containing the uncertainty text and those receiving the questionnaire without the uncertainty text.

Table 1. Response rate, by stratum.

Strata	Initial sample size	Undeliverables	Responses	Response rate adjusted for undeliverables
Core area landowners				
No uncertainty text	1,400	203	566	47.3
Uncertainty text	1,400	232	511	43.8
All	2,800	435	1,077	45.5
Peripheral area landowners				
No uncertainty text	1,400	179	453	37.1
Uncertainty text	1,400	195	453	37.6
All	2,800	374	906	37.3
Total	5,600	809	1,989*	41.5

* The total includes six respondents who removed their identification numbers and therefore could not be categorized as core or peripheral area landowners.

Non-response Bias Analysis

No statistically significant (p<.05) differences were found between respondents to the mail survey and non-respondents contacted by telephone with regard to their <u>awareness of or experiences with moose</u> in NYS, or in their <u>beliefs about the benefits of moose</u>, with one exception. Respondents were more likely than non-respondents to agree with the statement that they like knowing moose live in NYS (Appendix Table C-1). Respondents' and non-respondents' <u>concerns about moose</u> differed more substantially. Respondents, especially in the peripheral range, expressed a greater level of concern related to the possibility of moose-vehicle collisions, moose damage to forests, and a potential moose population decline than non-respondents.

There was no difference in age between respondents and non-respondents. Men were more likely to respond to the mail survey than the telephone follow-up (67-69% vs. 48-52%). This difference is likely due in part to the different methods of contact, as the mailed questionnaires were more likely to be addressed to men as the primary property owner in households with both men and women owners.

Respondent Characteristics

Two-thirds of mail survey respondents were men (Table 2). We were concerned that men might be overrepresented in our sample because of the differences we saw between the mail survey and the non-respondent telephone follow-up. We examined the ownership listings of a sub-sample of respondents to identify the likely gender (based on first name) of the primary and secondary owners. We found that in cases where a man and a woman are listed as property owners, the man is most often listed as the primary owner and the woman as the secondary owner. Since our address labels only have space for the primary owner the tendency for men to be listed first likely contributed to men being overrepresented in our sample. Based on our sub-sample the expected gender breakdown would have been 50% men and 50% women (+/- 9%).

To gauge the impact of this overrepresentation on our results, we compared responses by gender to key questions in the survey and found several variables (e.g., moose population trend desired, support for establishment of a moose hunting season to manage moose numbers, and participation in hunting) with significant differences. To assess the impact of these differences we weighted results equally by gender and compared those estimates with estimates based on our unweighted data (Appendix Table C-2). We considered the differences between weighted and unweighted data to be minor, and therefore, did not weight any of the results presented in the report by gender. Participation in hunting differed the most by gender and we will discuss this difference in more detail when we describe outdoor activity participation by respondents.

Table 2. Socio-demographic characteristics, political leaning, and outdoor activities, by core and peripheral area landowners.

Respondent Characteristics	Percent	
	Core area landowners	Peripheral area landowners
Gender		
Male	67.3	68.7
Female	32.7	31.3
Education*		
High school degree or less	17.8	27.0
Some college	35.3	34.8
College degree	23.7	17.5
Graduate degree	23.2	20.7
Current residence*		
Rural area	55.6	60.0
Village or hamlet	28.5	20.6
Small city (10,000 to 50,000 people)	10.2	17.8
Large city (over 50,000 people)	5.6	1.6
Primary residence based on mailing address*		
Core area	67.3	1.0
Peripheral area	3.3	91.7
Outside study area	29.3	7.3
Within NYS	18.8	5.9
Outside NYS	10.5	1.4
Political leaning		
Liberal	20.7	19.3
Moderate/Middle of the road	36.9	42.7
Conservative	42.4	38.0
Outdoor activity participation in past year		
Hiking*	67.9	56.3
Boating (motorized or non-motorized)*	68.0	52.1
Camping	39.0	37.1
Watching birds or wildlife*	67.4	61.8
Fishing*	47.9	41.5
Hunting	31.4	32.6
Fishing or hunting*	53.4	48.5
Any type of wildlife-related activity*	83.1	79.4
	Mean	
Age	63.4	63.1

*Statistically significant difference between core and peripheral area landowners at P=0.05 using chi-square test.

The average age of respondents was 63 years old (Table 2). Respondents from the core area were more likely to have a college degree (47% versus 38%). There were no differences between core and peripheral area landowners in our measure of political leaning, with equal numbers being moderate or conservative, and fewer being liberal.

By comparing the mailing addresses, which we considered to be the primary residences, of respondents with the property addresses sampled, we found that 29% of core area landowners had primary residences outside the core and peripheral areas (Table 2). Of the 29% with a primary residence outside the study area, 66% had a primary residence within New York State and 34% were outside the state. The percent with a primary residence outside the study area for peripheral area landowners was much lower at 7%.

Survey respondents participated in a number of outdoor activities in the past year (Table 2). Two-thirds of core area landowners and over half of peripheral area landowners participated in hiking, boating, and watching birds or wildlife. Almost 40% to 50% of respondents participated in camping or fishing. Hunting was less popular, with about one-third of respondents participating in the past year. When the data was weighted for the presumed gender bias discussed earlier, the percent participating dropped to one-quarter. Wildlife-related activities generally (i.e., wildlife-watching, fishing and hunting) were very popular, with about 80% of respondents participating.

We assessed respondents' environmental beliefs by asking about their level of agreement with a series of statements as described by Stedman (2004) and Knight (2008). Using factor analysis, we identified two domains within respondents' environmental beliefs, an ecological orientation domain (including statements such as "humans must live in harmony with nature in order to survive" and "the balance of nature is very delicate and easily upset") and an economic/human orientation domain (including statements such as "plants and animals exist primarily to be used by humans" and "humans have the right to modify the natural environment") (49% of variance explained). Items within each domain were combined to make two scales that were used in later analysis of factors influencing support for potential moose management actions.

Responses to individual items within these domains demonstrated that most landowners had positive beliefs in the ecological orientation domain; 74% to 91% agreed with the three variables measuring this domain (Table 3). Respondents were less likely to agree with statements in the economic/human orientation domain, especially the statement that "humankind was created to rule over the rest of nature," with only 16% agreeing. Three items included among the economic/human beliefs proposing that "the best government is the one that governs the least," "most environmental problems can be solved by applying more and

better technology" and "humans have the right to modify the natural environment" had average scores closer to neutral.

Table 3. Environmental beliefs by core and peripheral area landowners.

Beliefs	Mean* agreement/disagreement (% agreeing)	
	Core area landowners	Peripheral area landowners
Ecological (α=0.652)		
Humans must live in harmony with nature in order to survive	4.57 (90.8%)	4.56 (90.8%)
The balance of nature is very delicate and easily upset	4.16 (78.1%)	4.18 (80.4%)
When humans interfere with nature, it often produces disastrous consequences	3.96 (73.7%)	4.02 (75.2%)
Economic / human (α=0.581)		
The best government is the one that governs the least	3.49 (53.2%)	3.46 (51.3%)
Most environmental problems can be solved by applying more and better technology	3.27 (47.0%)	3.30 (49.2%)
Humans have the right to modify the natural environment	2.66 (29.9%)	2.56 (26.9%)
Plants and animals exist primarily to be used by humans	2.39 (23.7%)	2.41 (24.6%)
Humankind was created to rule over the rest of nature	2.03 (15.5%)	2.04 (16.1%)

*Agreement was measured on a scale where 1=strongly disagree to 5=strongly agree.

Awareness of and Experiences with Moose

Almost all respondents (96-97%)[2] knew moose lived in some parts of New York State. Of those who knew moose lived in the state, 70% to 76% were willing to provide an estimate of the number of moose they thought lived in the state (Table 4). DEC estimates that there are more than 400 moose currently living in NYS, which is within the range (100-500 animals) that a

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[2] Ranges indicate results from core and peripheral area landowners.

plurality of the respondents perceived the number to be. About a quarter of respondents indicated they thought the population of moose was between 500 and 1,000.

One-quarter to one-third of landowners indicated they had seen a moose in New York in the past five years (Table 5). Similar percentages saw a moose prior to 2015. Overall, about half had seen a moose at some time in NYS. Fewer respondents (32-36%) who owned property in the study area, but had a primary residence outside the area, had seen a moose, as would be expected because they are likely spending less time in the area. One-third of peripheral area landowners and almost half of core area landowners had seen what they thought was evidence or sign of moose, such as tracks or scat. Fewer respondents who owned property in the study area, but had a primary residence outside the area, had seen evidence or sign of moose (19-30%). Core area landowners were more often likely to see moose or moose sign than peripheral area landowners, which aligns with DEC's belief that there are more moose with a longer history of habitation in the core than peripheral areas.

Table 4. Perceived moose population size by core and peripheral area landowners.

	Percent	
Perceived moose population size*	Core area landowners	Peripheral area landowners
<100 animals	11.6	11.8
100-500 animals	32.8	28.6
500-1,000 animals	24.6	21.7
>1,000 animals	6.7	7.6
Don't know	24.1	30.3

*Statistically significant difference between core and peripheral area landowners at $P=0.05$ using chi-square test.

Table 5. Interactions with moose in NYS by core and peripheral area landowners.

Interactions with moose in NYS	Percent	
	Core area landowners	Peripheral area landowners
Saw one in the past five years (2015-2019)*	33.9	24.7
Saw one prior to 2015	29.0	28.3
Saw one at some time in NYS*	53.8	46.0
Saw evidence of moose (tracks, scat, etc.)*	44.7	32.5
Sighting locations		
On or near a public road*	64.3	56.2
In a marshy area, bog, or by a lake*	42.1	27.5
In the woods	27.6	24.4
In an open field*	19.5	32.0
On my property	21.5	17.4
Near buildings	11.6	14.4
Overall positive or negative experiences with moose in NYS*		
Very positive	56.3	45.3
Somewhat positive	14.8	19.9
Neither positive or negative	27.1	32.4
Somewhat negative	1.0	1.2
Very negative	0.9	1.2

*Statistically significant difference between core and peripheral area landowners at P=0.05 using chi-square test.

Moose were most often seen on or near a public road; over half of respondents who had seen a moose had seen one in this setting (Table 5). Core area landowners were more likely than peripheral area landowners to see moose in marshy areas, bogs, or by lakes. Peripheral area landowners were more likely to see them in open fields. These differences likely reflect differences in available moose habitat types in each area.

Of those who had seen a moose, 17% to 22% had seen a moose on their property (Table 5). Using property address information available from the property tax records we were able to map these locations where moose were seen (Figure 2). Discussions with DEC staff suggested that the areas where our respondents saw moose were similar to areas where recent sightings have been reported by the public. Data from Figure 2 can also be used to inform future decisions about locations where DEC focuses their moose population monitoring efforts.
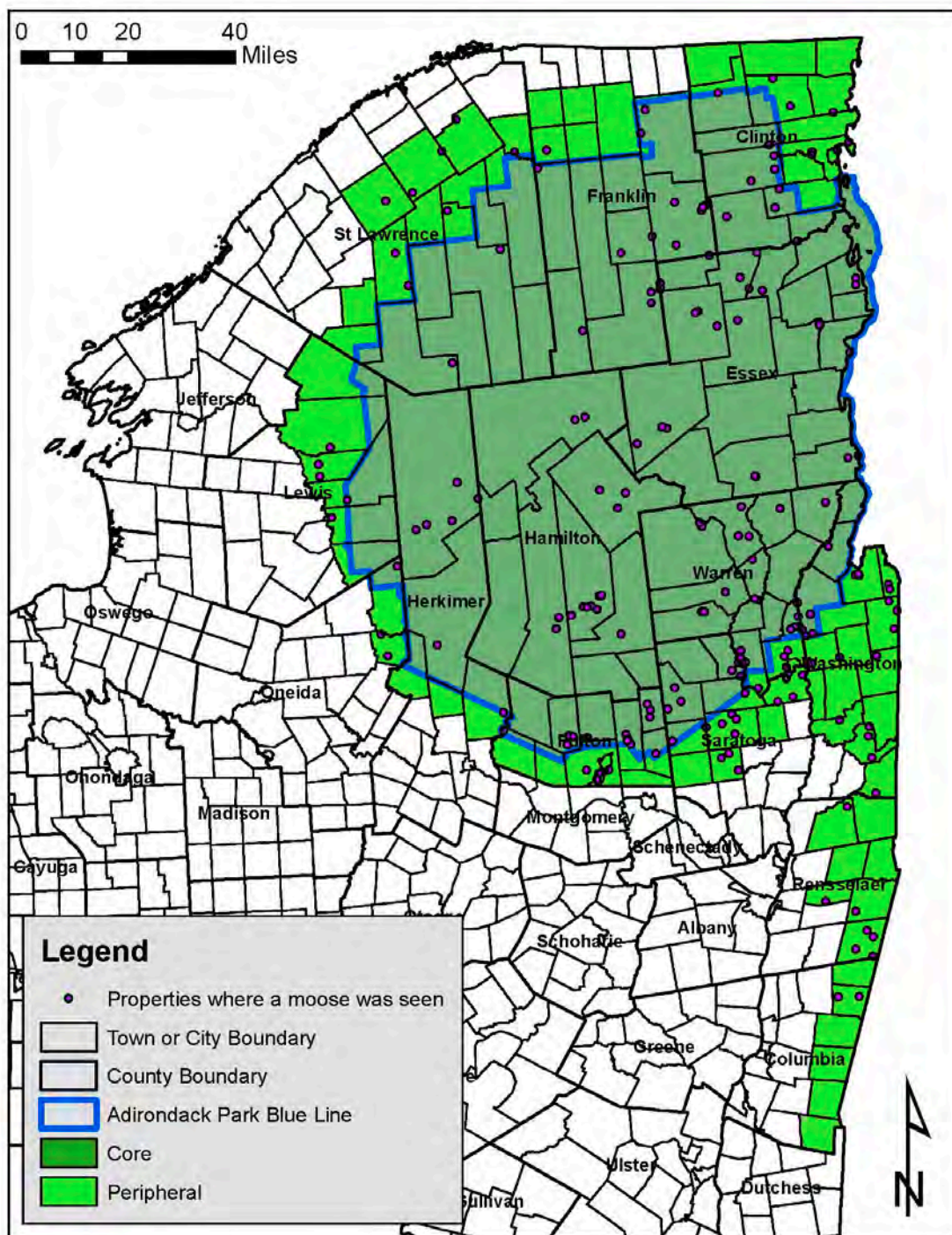
Figure 2. Locations where a moose was sighted on the property of a respondent.

Respondents who had seen moose or evidence of moose were asked how they would rate their experiences with moose from very positive to very negative. The majority of core area landowners and almost half of peripheral area landowners indicated their experiences have been very positive (Table 5). Less than 3% of respondents reported an overall negative experience.

Benefits of Having Moose in NYS

Respondents perceive a variety of benefits of having moose in NYS: ranging from knowing they live in the state (85-87%), to their desire to see one themselves (86-90%), to having others have the opportunity to see one in the wild (86-87%) (Table 6). Three-quarters of respondents think moose play an important role in nature. Landowners in the core area were more likely than peripheral area landowners to think that the presence of moose benefits the rural NY economy, but at least 60% of both groups think there is a benefit. These benefits, encompassing the first five items listed in Table 6, form a scale with high reliability (Cronbach's alpha = 0.900) and a high percentage of the variation in responses explained (72%). This scale, which reflects perceptions of the non-hunting benefits of moose, is used in later analysis of factors influencing support for potential moose management actions.

An additional benefit of moose, which was not related to the other benefits based on factor analysis, was the opportunity to hunt moose if the population gets large enough in NYS. More peripheral area landowners than core area landowners saw the opportunity to hunt moose as a benefit (66% vs. 59%) (Table 6). More core area landowners than peripheral area landowners did not see hunting as a benefit (23% vs. 17%). Those who had hunted in the past year were twice as likely as those who had not hunted to strongly agree that people should have the opportunity to hunt moose (68-70% vs. 24-29%).

Table 6. Benefits of moose, by core and peripheral area landowners.

Benefits	Mean* agreement / disagreement (% agreeing, % strongly agreeing)	
	Core area landowners	Peripheral area landowners
I would like to see a moose in the wild**	4.57(89.6%, 75.8%)	4.49 (86.4%, 70.1%)
I like knowing that moose live in NYS	4.54(87.6%, 73.9%)	4.47 (84.6%, 69.4%)
I would like people to have the opportunity to see moose in the wild in NYS	4.45 (86.0%, 68.0%)	4.46 (86.8%, 66.4%)
I think moose play an important role in nature	4.27 (78.0%, 56.3%)	4.19 (74.6%, 52.9%)
I think the presence of moose benefits the rural NY economy**	3.95 (65.1%, 42.0%)	3.80 (59.5%, 33.9%)
I think people should have the opportunity to hunt moose, if the moose population gets large enough in NYS**	3.61 (59.2%, 38.1%)	3.80 (65.5%, 41.9%)

*Agreement was measured on a scale where 1=strongly disagree to 5=strongly agree.

**Statistically significant difference between core and peripheral area landowners at P=0.05 using t-test.

Concerns about Moose

Concerns related to moose in NYS factored into two groups – concerns for the moose themselves, related to moose health and population size, and concerns about how moose could affect humans (64% of variance explained).[3] These two factors were used in later analysis explaining support for potential moose management actions. With regard to concerns for the moose themselves, one-third of respondents were very concerned that the moose population in NYS might decline in the coming years, and one-fifth were very concerned moose might suffer from parasites or diseases carried by other animals (Table 7). Women were more likely than men to be very concerned about the population declining in the coming years (39-42% vs. 32-37%).

As for negative impacts of moose on humans, over half of the respondents were moderately or very concerned about the possibility of moose-vehicle collisions occurring in NYS (Table 7).

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[3] Less than 10% of respondents had "no opinion" about any of the concerns and were removed from the analysis of concerns.

Those who had seen a moose on or near a public road were more likely to be very concerned (27-30% vs. 18-20%). Respondents were less concerned about moose being aggressive toward people or impacting the habitat of other species they care about (e.g., birds). Men were less likely than women to be concerned about moose being aggressive or impacting habitat (43-44% vs. 33-41% not at all concerned about aggressive behavior, 45-48% vs. 35-40% not at all concerned about impacts on habitat). Respondents were least concerned about moose damage to forests and plants in NYS. Those with less education (high school diploma or less) were more concerned than more educated respondents about forest damage (mean = 1.7-1.9 vs. 1.6-1.7). Perceived moose population size was not correlated with level of concern related to negative impacts of moose.

Table 7. Concerns about moose, by core and peripheral area landowners.

Concerns	Mean* level of concern (% moderately concerned, % very concerned)	
	Core area landowners	Peripheral area landowners
Negative impacts affecting moose (α=0.432)		
The moose population in NYS might decline in the coming years**	2.97 (28.3%, 36.4%)	2.86 (28.4%, 30.5%)
Moose might suffer from parasites or diseases carried by other animals	2.65 (29.4%, 22.1%)	2.61 (28.1%, 21.3%)
Negative impacts affecting humans (α=0.773)		
The possibility of moose-vehicle collisions occurring in NYS	2.66 (31.5%, 22.0%)	2.65 (28.3%, 23.8%)
Moose threatening or being aggressive toward people	1.90 (16.9%, 7.3%)	1.99 (16.2%, 10.5%)
Moose might impact the habitat of other species I care about (e.g., birds)	1.86 (17.1%, 5.8%)	1.92 (17.2%, 7.5%)
Moose damage to forests and plants in NYS**	1.60 (12.4%, 3.1%)	1.76 (13.9%, 5.2%)

*Concern was measured on a scale where 1=not at all concerned to 4=very concerned.

**Statistically significant difference between core and peripheral area landowners at P=0.05 using t-test.

Trust in Information from Scientists and Trust in DEC

Trust in scientists was high, with over 70% agreeing with the statement that they trust information about moose coming from scientists (Table 8). There were differences, however, in the level of trust depending on education, political leaning, gender, and hunting participation (Table 9). Those who had less education, a conservative political leaning, or hunted were less likely to trust information about moose coming from scientists compared with their counterparts.

Table 8. Trust in scientists and DEC regarding information and management decisions related to moose, by core and peripheral area landowners.

	Mean* agreement / disagreement (% agreeing)	
Level of trust	Core area landowners	Peripheral area landowners
I trust information about moose coming from scientists	4.00 (72.7%)	3.93 (70.3%)
DEC understands which factors to consider when deciding how to manage moose	3.61 (61.1%)	3.67 (61.9%)
I trust DEC to make decisions about how to manage moose	3.55 (58.6%)	3.62 (59.8%)

*Agreement was measured on a scale where 1=strongly disagree to 5=strongly agree.

Trust in DEC's ability to manage moose was relatively high, with 59-62% of respondents agreeing that DEC understands the factors to consider when deciding how to manage moose and trusts DEC to make those decisions (Table 8). The two variables measuring trust in DEC were combined to create a trust in DEC score (r_{sb}=0.943). We found that the level of trust was related to political leaning, primary residence, and whether they went hunting in the past year (Table 10). Those who had a more conservative political leaning or had hunted in the past year were less likely than others to trust DEC. Those who lived in the core area were less likely than those whose primary residence was outside the study area to trust DEC. This trust variable and the one measuring trust in scientists were used in later analysis of factors influencing support for potential moose management actions.

Table 9. Trust in information coming from scientists, by variables with significant differences.

	Mean trust in information from scientists	
	Core area landowners	Peripheral area landowners
Education		
High school degree or less	3.8[a]	3.7[a]
Some college or more	4.1[b]	4.0[b]
Political leaning		
Liberal	4.5[a]	4.5[a]
Moderate/Middle of the road	4.1[b]	4.0[b]
Conservative	3.7[c]	3.6[c]
Gender		
Male	4.0	3.9[a]
Female	4.1	4.1[b]
Hunted in past year		
No	4.1[a]	4.1[a]
Yes	3.8[b]	3.6[b]

*Trust in information was measured on a scale where 1=strongly disagree to 5=strongly agree.

[a,b,c] Within a landowner group, variable categories without a letter in common are significantly different from each other at $p < 0.05$ using t-test or Scheffe's test.

Table 10. Trust in DEC's ability to manage moose, by variables with significant differences.

	Mean trust in information from scientists	
	Core area landowners	Peripheral area landowners
Political leaning		
Liberal	3.8[a]	3.9[a]
Moderate/Middle of the road	3.7[a]	3.7[a,b]
Conservative	3.4[b]	3.5[b]
Hunted in past year		
No	3.6[a]	3.7[a]
Yes	3.5[b]	3.4[b]
Primary residence		
Inside study area	3.5[a]	3.6
Outside study area	3.7[b]	3.6

*Trust in information was measured on a scale where 1=strongly disagree to 5=strongly agree.

[a,b] Within a landowner group, variable categories without a letter in common are significantly different from each other at $p < 0.05$ using t-test or Scheffe's test.

Overall Feelings about Moose, and Desired Population Trend

The majority of respondents enjoy moose and do not worry about the problems they may cause (Table 11). Core area landowners were more likely than peripheral area landowners to feel this way (66% vs. 57%). Peripheral area landowners were more likely than core area landowners to enjoy moose but worry (25% vs. 21%) or have no particular feelings about moose (17% vs. 12%). Almost no one regarded moose as a nuisance. Those few who did, however, tended to have negative experiences with moose, not believe that moose provided non-hunting benefits in NYS, be more concerned about the negative impacts of moose on humans, and distrust DEC. The core area landowners who considered moose a nuisance did not tend to trust information from scientists (Table 12). On the other hand, those who enjoyed moose and did not worry about problems they might cause were more likely to think that moose in NYS provided non-hunting benefits and less likely to be concerned about the negative impacts of moose on humans. The perceived benefit of having the opportunity to hunt moose was not related to respondents' overall feelings about moose in NYS.

Table 11. Feelings about moose in NYS and future population trend desired, by core and peripheral area landowners.

	Percent	
	Core area landowners	Peripheral area landowners
Feelings about moose*		
I enjoy moose and <u>do not worry</u> about problems they may cause	65.7	57.2
I enjoy moose but I <u>worry</u> about problems they may cause	20.8	25.0
I <u>do not enjoy</u> moose and I regard them as a nuisance	1.1	0.8
I have no particular feelings about moose	12.5	16.9
Population trend desired*		
Decrease	1.6	1.3
Stay the same	16.3	19.3
Increase	67.6	58.9
No opinion	14.5	20.5

*Statistically significant difference between core and peripheral area landowners at P=0.05 using chi-square test.

Two-thirds of core area landowners and three-fifths of peripheral area landowners would like to see the moose population increase in the future (Table 11). Very few respondents (<2%) would like to see the population decrease. More peripheral area landowners than core area landowners had no opinion about how they would like to see the population change (21% vs. 15%). Those who wanted an increase in the moose population were similar to those who had positive feelings about moose and did not worry about moose-related problems. They were more likely than other groups to think that moose in NYS provided non-hunting benefits and less likely to be concerned about the negative impacts of moose on humans (Table 13). Beliefs about the potential benefit of having the opportunity to hunt moose were not related to desired future moose population trend. Those who wanted a decrease in the population were more likely to have had negative experiences with moose in the past, and were less likely to trust DEC or scientists. Perceived population size was not correlated with desired moose population trend.

Table 12. Variables with significant differences, by feelings about moose in NYS.

	Mean					
	Core area landowners			Peripheral area landowners		
	Enjoy, do not worry	Enjoy, but worry	Nuisance	Enjoy, do not worry	Enjoy, but worry	Nuisance
Experiences with moose*	1.5^a	0.9^a	-1.4^b	1.3^a	0.7^a	-0.3^b
Non-hunting benefits**	4.6^a	4.2^a	2.2^b	4.5^a	4.2^a	2.1^b
Negative impacts affecting humans***	1.7^a	2.6^b	3.0^b	1.7^a	2.7^b	3.3^c
Trust DEC to manage moose**	3.6^a	3.6^a	2.2^b	3.7^a	3.7^a	2.8^b
Trust information from scientists**	4.1^a	3.9^a	2.8^b	4.0	3.9	3.9

*Measured on a scale where -1=very negative to 1=very positive.

**Agreement was measured on a scale where 1=strongly disagree to 5=strongly agree.

***Concern was measured on a scale where 1=not at all concerned to 4=very concerned.

[a,b,c] Within a landowner group, feelings about moose categories without a letter in common are significantly different from each other at $p< 0.05$ using Scheffe's test.

Table 13. Variables with significant differences, by moose population trend desired.

	Mean					
	Core area landowners			Peripheral area landowners		
	Decrease	Stay the same	Increase	Decrease	Stay the same	Increase
Experiences with moose*	-0.6[a]	0.7[b]	1.5[c]	0.0[a]	0.9[b]	1.3[b]
Non-hunting benefits**	2.1[a]	4.0[b]	4.6[c]	2.5[a]	4.0[b]	4.6[c]
Negative impacts affecting humans***	3.2[a]	2.4[b]	1.8[c]	3.6[a]	2.5[b]	1.8[c]
Trust DEC to manage moose**	2.1[a]	3.6[b]	3.6[b]	2.6[a]	3.6[b]	3.7[b]
Trust information from scientists**	3.0[a]	3.9[b]	4.1[b]	3.3[a]	3.9[a,b]	4.0[b]

*Measured on a scale where -1=very negative to 1=very positive.

**Agreement was measured on a scale where 1=strongly disagree to 5=strongly agree.

***Concern was measured on a scale where 1=not at all concerned to 4=very concerned.

[a,b,c] Within a landowner group, feelings about moose categories without a letter in common are significantly different from each other at $p< 0.05$ using Scheffe's test.

Support for Management Actions Given Different Moose Population Sizes

We presented respondents with descriptions of three different moose population scenarios – the current situation, a future where the population had increased, and a future where the population had decreased. For each scenario, we provided information about the likely impacts of a moose population at that level, such as moose-vehicle collisions, damage to young trees on private forest land, and opportunities to view moose. Given these conditions, we asked respondents what actions they would support DEC or others taking to manage moose.

Using regression analysis, we identified factors that explained respondents' support for these actions. A variable representing the sample (core or peripheral) from which the respondent came was included in each regression. It was usually never significant in the model but was needed to account for potential variation due to sample stratification.

Support for Actions Given the Current Moose Population Size

Information provided in the questionnaire about the likely impacts of the current moose population included:

- Some people have seen moose or signs of moose and enjoy that experience.
- Approximately 10-20 moose-collisions occur per year in New York State. Because of the size of moose, collisions can cause extensive damage including injuries to people.
- Moose spend much of their time on private, forest land eating young trees which can prevent the trees from growing into harvestable timber.
- Scientists are unsure whether the moose population will increase, decrease, or stay the same in the future.

After reading the information above, respondents were asked about their level of support or opposition to six possible actions that could be taken by DEC or others (e.g., DOT posting additional warning signs along roadways). The actions factored into two groups – non-lethal actions and lethal actions (61% of variance explained). Support for non-lethal actions was high, with over 85% supporting increased signage where moose-vehicle collisions might occur, 75% supporting promotion of moose viewing opportunities which might benefit the local economy, and slightly fewer respondents supporting increased funding for research and reducing speed limits in areas where collisions might occur (Table 14). Less than 20% of respondents opposed any of these actions.

Table 14. Support for management actions given the current moose population.

| | Percent | | | | | |
| Possible actions given current situation | Core area landowners | | | Peripheral area landowners | | |
	Support	Neither support nor oppose	Oppose	Support	Neither support nor oppose	Oppose
Non-lethal actions (α=0.682)						
Increase signage where moose-vehicle collisions might occur	87.6	9.9	2.6	86.0	9.8	4.2
Promote moose viewing opportunities, which might benefit the local economy	74.6	15.5	9.9	74.1	16.7	9.2
Increase funding for research to better understand New York's moose population	71.5	18.0	10.6	69.0	19.1	11.9
Reduce speed limits where moose-vehicle collisions might occur	63.4	20.6	16.0	65.8	19.5	14.8
Lethal actions (r_{sb}=0.712)						
Establish a moose hunting season to manage moose numbers*	56.1	18.7	25.3	61.3	17.6	21.0
DEC issues nuisance permits to shoot moose on properties with too much damage to young forests*	41.3	19.0	39.7	47.0	19.2	33.8

* Statistically significant difference between core and peripheral area landowners at P=0.05 using t-test.

Using regression analysis, we found six significant factors that explained respondents support for the non-lethal actions scale (Table 15). The most important factors were trust in DEC and agreement that moose provide non-hunting benefits. Those who trusted DEC to manage moose and those who agreed that moose provide non-hunting benefits were more likely to support non-lethal management actions. Support for non-lethal actions also increased as concern about the negative impacts to moose, such as disease or parasites, increased. Those who trusted the information provided by scientists were also more likely to support non-lethal actions. Support for non-lethal actions was less among those who thought people should have the opportunity to hunt moose if the population gets large enough. Further, support for non-lethal actions increased as a person's ecological orientation increased.

Table 15. Factors explaining support for non-lethal and lethal actions given the current moose population or an increased population.

	Standardized beta coefficient			
	Non-lethal actions		Lethal actions	
Factors	Current population	Increased population	Current population	Increased population
Trust DEC to manage moose	0.200	0.202	0.115	0.151
Trust information from scientists	0.147	0.143		
Non-hunting benefits	0.212	0.210	-0.185	-0.193
Hunting benefit	-0.118	-0.117	0.554	0.557
Negative impacts affecting moose	0.163	0.138		
Negative impacts affecting humans			0.134	0.124
Ecological orientation	0.136	0.163		
Economic/human orientation			0.114	0.083
Male gender				0.061
Education level				0.050
Core area landowners	-0.008*	-0.033*	-0.017*	-0.038
Adjusted R^2	0.315	0.314	0.430	0.437

* Not significant at P=0.05.

Lethal control actions were less frequently supported and more often opposed than non-lethal actions (Table 14). Peripheral area landowners were more likely than core area landowners to support these actions. Slightly over half of core area landowners and somewhat more peripheral area landowners supported the establishment of a moose hunting season to manage moose numbers. Twenty to twenty-five percent opposed this action. Fewer respondents supported (41-47%) and more opposed (34-40%) DEC issuing nuisance permits to shoot moose on properties with too much damage to young forests.

Support for the lethal control action scale was explained by five significant factors, the most important of which was the belief that people should have the opportunity to hunt moose if the moose population gets large enough in New York State (Table 15). Support for lethal control actions also increased as concern about negative impacts of moose on humans, such as moose-vehicle collisions, increased. Those who have a stronger economic/human orientation were also more likely to support lethal control actions. Another factor influencing support for lethal control actions was trust in DEC to manage moose. As trust in DEC's ability to manage moose increased so did support for lethal control actions. We found a negative relationship between agreement that moose provide non-hunting benefits and support for lethal control actions. People who agree that moose provide non-hunting benefits (e.g., viewing, existence) of moose were less likely to support lethal control actions.

Support for Actions if the Moose Population Increased

Information provided in the questionnaire about a hypothetical, plausible future moose management scenario and the likely impacts of moose included:

- The moose population has increased and expanded out from the Adirondack Park where most of the moose currently live.
- People have more opportunities to see moose, both inside the park and in surrounding areas.
- The local economy benefits from people who come to see moose.
- The chances of moose-vehicle collisions are greater.
- The damage to young trees is more intense and widespread making it harder for more people to grow trees into harvestable timber.
- With the larger moose population, parasites will more easily spread among the moose. Scientists are unsure if this will eventually reduce the moose population.

After reading the information above, respondents were asked about their level of support or opposition to the same six possible actions, but in the context of a higher moose population. The actions factored into the same two groups – non-lethal actions and lethal actions (62% of variance explained). Support for non-lethal actions was again high, with almost 90% supporting increased signage where moose-vehicle collisions might occur, 75% supporting promotion of moose viewing opportunities which might benefit the local economy, and slightly fewer respondents supporting increased funding for research and reducing speed limits in areas where collisions might occur (Table 16). Less than 15% of respondents opposed any of these actions. Support for increased signage and reducing speed limits grew slightly when asked about increased moose population levels compared with the current situation (using paired samples t-test). Support did not change for the other two non-lethal actions.

Table 16. Support for management actions if the moose population increased.

| Possible actions if population increased | Percent | | | | | |
| | Core area landowners | | | Peripheral area landowners | | |
	Support	Neither support nor oppose	Oppose	Support	Neither support nor oppose	Oppose
Non-lethal actions (α=0.703)						
Increase signage where moose-vehicle collisions might occur	89.6	7.4	3.1	88.7	7.4	3.9
Promote moose viewing opportunities, which might benefit the local economy	74.6	14.8	10.5	74.9	16.6	8.5
Increase funding for research to better understand New York's moose population	73.3	15.7	11.0	71.5	17.3	11.2
Reduce speed limits where moose-vehicle collisions might occur*	66.8	18.9	14.4	71.2	16.5	12.3
Lethal actions (r_{sb}=0.745)						
Establish a moose hunting season to manage moose numbers*	66.2	14.6	19.2	71.5	12.9	15.6
DEC issues nuisance permits to shoot moose on properties with too much damage to young forests*	50.2	17.5	32.2	57.9	16.6	25.5

* Statistically significant difference between core and peripheral area landowners at P=0.05 using t-test.

The same six factors that explained respondents support for the non-lethal action scale under the current population scenario also explained support under an increased population scenario (Table 15). Support was stronger and more likely if people: 1) trusted DEC to manage moose 2) trusted information coming from scientists, 3) agreement that moose provide non-hunting benefits, 4) disagreement that moose provide hunting benefits if the population got large enough, 5) had a higher level of concern about environmental factors that could have negative impacts on moose, such as disease and parasites, and 6) had a stronger ecological orientation.

Support for lethal control actions increased under the scenario of an increased moose population compared with the current situation. Two-thirds of core area landowners and almost three-quarters of peripheral area landowners supported the establishment of a moose hunting season to manage moose numbers; 16-19% opposed this action (Table 16). Fewer respondents supported (50-58%) and more opposed (26-32%) DEC issuing nuisance permits to shoot moose on properties with too much damage to young forests.

The same five factors that explained respondents' support for the lethal control action scale under the current population scenario also explained support under an increased population scenario, with the addition of two other significant factors (Table 15). The most important factor by far was still agreement with the statement that people should have the opportunity to hunt moose if the population got large enough. The other four original factors had similar relationships with support for lethal control, but trust in DEC was a little more important and having an economic/human belief orientation was a little less important. The two additional factors explaining support were gender and education. Men and those with higher education levels were more likely to support the use of lethal control under an increased moose population scenario.

Support for Actions if the Moose Population Decreased

Information provided in the questionnaire about a hypothetical, plausible future moose management scenario and the likely impacts of moose included:

- The moose population has decreased because of natural factors.
- People have fewer opportunities to see moose.
- The chances of moose-vehicle collisions are lower.
- Damage to young trees has decreased, making it easier for most people to grow trees into harvestable timber.
- Deer in New York carry parasites that kill moose, which could further jeopardize the moose population.
- Scientists are unsure whether the moose population will be able to survive in New York.

After reading the information above, respondents were asked what actions they would support if the moose population decreased in NYS. Two-thirds of respondents would support increased funding for research to better understand the decline (Table 17). Almost as many respondents would support moving moose from areas where they are plentiful to areas with good habitat but fewer moose. Over 50% of respondents would support encouraging landowners to improve moose habitat. Less than 20% of respondents opposed any of these actions. Factor analysis revealed that these three actions were supported similarly by respondents (63% of variance explained), and they were averaged into one variable, called "generally supported actions." The other two actions we asked about (lessening restrictions on timber cutting, and reducing the number of deer) were more controversial and respondents reacted differently to each of them. Half of the respondents supported lessening restrictions on timber cutting practices on private land in the Adirondack Park so more young forest (ideal moose habitat) can be created, but one-quarter opposed this action. The least supported (40-43%) and most opposed (30-32%) action was to reduce the number of deer in core moose habitat to reduce parasites that are spread to moose by deer.

Seven significant variables explained respondents' support for the "generally supported actions" scale (increased funding for research, moving moose, and encouraging habitat improvement) (Table 18). The most important factor explaining support for the three actions was concern about the negative impacts on moose, such as disease and parasites. Three other factors – trust in DEC to manage moose, trust in information from scientists, and agreement with non-hunting benefits were also important in explaining support for these generally supported actions. Respondents who agreed that people should have the opportunity to hunt moose were less supportive of these actions. The other two factors (ecological orientation and negative impacts of moose on humans) were somewhat less important in explaining support for these actions.

Four factors were significantly related to support for reducing the number of deer in core moose habitat to reduce parasites that are spread to moose by deer, but the explanatory power of the model was low (adjusted R^2=0.143) (Table 18). Those who hunted in the past year were less likely to support this action. While this action did not specify how the number of deer would be reduced, it seems likely that hunters thought their opportunity to hunt deer would be reduced, and therefore did not support this action (49-51% of those who hunted in the past year opposed this action compared with 22-24% of those who had not hunted). Those that trusted DEC to manage moose and those who were concerned about the negative impacts to moose, such as disease and parasites, were more likely to support this action. Respondents whose primary residence was outside the study area were more likely to support this action as well.

Table 17. Support for management actions if the moose population decreased.

| | Percent | | | | | |
| Possible actions if population decreased | Core area landowners | | | Peripheral area landowners | | |
	Support	Neither support nor oppose	Oppose	Support	Neither support nor oppose	Oppose
Generally supported actions (α=0.708)						
Increase funding for research to better understand the decline in New York's moose population*	69.5	19.1	11.5	66.2	20.2	13.7
Move moose from areas where they are plentiful to areas with good habitat but fewer moose	62.9	19.8	17.3	64.3	18.2	17.6
Encourage landowners to improve moose habitat	56.9	32.8	10.2	54.7	32.3	13.0
More controversial actions						
Lessen restrictions on timber cutting practices on private land in the Adirondack Park, so more young forest (ideal moose habitat) can be created	50.9	25.2	24.0	51.6	24.4	24.0
Reduce the number of deer in core moose habitat to reduce parasites that are spread to moose by deer	42.8	27.0	30.2	39.9	27.7	32.4

* Statistically significant difference between core and peripheral area landowners at P=0.05 using t-test.

Table 18. Factors explaining support for management actions given a decreased moose population.

Factors	Standardized beta coefficient		
	Generally supported actions	Reduce # of deer to reduce parasite spread to moose	Lessen restrictions on timber cutting practices on private land
Trust DEC to manage moose	0.178	0.189	0.071
Trust information from scientists	0.165		
Non-hunting benefits	0.187		0.087
Hunting benefit	-0.078		
Negative impacts affecting moose	0.230	0.113	
Negative impacts affecting humans	-0.137		
Ecological orientation	0.139		
Economic/human orientation			0.215
Hunted in past year		-0.236	
Primary residence outside study area		0.116	
Core area landowners	0.003*	0.062	-0.007
Adjusted R^2	0.357	0.142	0.055

* Not significant at P=0.05.

Lessening restrictions on timber cutting practices on private land in the Adirondack Park so more young forest can be created was another controversial action with a regression model with very low explanatory power (adjusted R^2=0.056) (Table 18). The most significant factor was a positive relationship between the economic/human belief orientation and support for lessening restrictions on timber cutting. The positive relationship between this factor, which included a statement that the best government is one that governs least, and the action of lessening restrictions on what landowners can do on private property seems a logical connection. Those who also supported this action were more likely to trust DEC to manage moose and agree with the non-hunting benefits of moose.

Effects of Introducing Scientific Uncertainty on Support for Management Actions and Trust

We tested the potential impact of scientific uncertainty around moose on support for management actions and trust in the management agency and scientists by randomly dividing

the sample in half (within each moose range) and including statements on uncertainty in half of the questionnaires. The other half of the questionnaires did not include these statements. These statements were part of the descriptions we provided for each scenario (i.e., current population, increased population, and decreased population), prior to asking about support for management actions and prior to the questions on trust in the management agency and scientists. The statements all contained the text "scientists are unsure" about some aspect of the trend in the size of the moose population.

- For the current population scenario, the statement was: "Scientists are unsure whether the moose population will increase, decrease, or stay the same in the future."
- For the increased population scenario, the statement was: "With the larger moose population, parasites will more easily spread among the moose. Scientists are unsure if this will eventually reduce the moose population."
- For the decreased population scenario, the statement was: "Scientists are unsure whether the moose population will be able to survive in New York."

We found no significant differences in support for any of the management actions between those who got questionnaires with the uncertainty statements versus not. We also found no significant differences in trust in DEC or in scientists based on who received questionnaires with the uncertainty statements. Furthermore, a variable for receiving the uncertainty statements versus not receiving the statements was not a significant factor, nor was an interaction term between the variable and trust in information from scientists or trust in DEC, in any of the models we developed explaining support for various management actions.

SYNTHESIS OF FINDINGS FROM THREE RESEARCH EFFORTS

This survey of landowners is the last in a series of research efforts we undertook to provide DEC with information from key stakeholders regarding attitudes, concerns and interests related to moose and their impacts, both now and in the future. The three stakeholder groups in the series of studies included (1) NYS residents (i.e., general public), (2) large private forestland owners and managers in northern New York, and (3) landowners in the core and peripheral moose ranges in New York (this study). Comparisons between stakeholder groups 1 and 3 are possible because of several identically worded questions on the survey instruments used. These results can be compared qualitatively with the second group who were asked similar questions during our interviews with them.

We found a range of experience with moose across stakeholder groups, as would be expected. Downstate residents (NYC, Long Island, Rockland and Westchester Counties) were least likely to know moose lived in NYS, and least likely to have seen one in the wild in NYS; upstate residents

were more likely to know about moose and have seen them; and almost all core and peripheral area landowners were aware of moose with about half indicating they had seen one in the wild in NYS (Table 19).

About two-thirds of New Yorkers like knowing moose live in the state and would like people to have the opportunity to see them in the wild (Table 19). The percentages were higher for landowners in areas with moose, presumably because they have positive perceptions of moose. Among large private forestland owners and managers in northern New York we spoke with, all acknowledged these positive benefits of having moose in NYS.

Our results from the general public survey show that NYS residents are divided, almost evenly, around the benefits of allowing hunting of moose if the population becomes large enough (Table 19). Support was higher among upstate residents and core and peripheral area landowners than it was for downstate residents. Large private forestland owners and managers in northern New York with whom we spoke supported hunting as a management action at some point, especially to reduce damage to regenerating forests, but were not in agreement about when that point might be reached.

There was relatively little concern among the general public about the potential for moose-vehicle collisions (Table 19). Those living in areas with moose, however, were more likely to be concerned about the possibility of collisions, with just over 50% expressing at least moderate concern.

Few New Yorkers in any part of the state were moderately or very concerned about moose damage to forests and plants in NYS (Table 19). Some large non-industrial private forestland owners and managers were also not very concerned about browse damage caused by moose. Conversely, most large industrial private forestland managers in northern New York we spoke with indicated browse damage, especially to regenerating forests, was a concern in some "hot spots" now, and could become a major concern if the moose population were to increase in the future. This difference in level of concern might merit further investigation into why the public does not share the concern of the industrial foresters. Is it that they do not think it is an important risk, are they unaware that damage is occurring, or are they unaware of the feeding behaviors of moose? If the public does not understand the concern they might be unlikely to support actions DEC or others might want to take to reduce the negative impacts of moose on forests and plants.

We also asked if people were concerned about a potential decline in the moose population in the coming years. We found about one-third of NYS residents were concerned about this possibility, and even more core and peripheral area landowners were concerned (Table 19). Several non-industrial forestland owners and managers thought that a decline could occur due

Table 19. Results from questions common to the Empire Poll and the landowner survey.

Questions common to both surveys	Percent				
	NYS residents	Downstate residents	Upstate residents	Peripheral area landowners	Core area landowners
Knowledge and experience					
Know moose live in NYS	49.4	44.7	57.8	96.0	97.0
Saw a moose in the wild in NYS	12.7	9.3	18.8	46.0	53.8
Benefits of moose					
Like knowing moose live in NYS	64.4	60.5	71.3	84.6	87.6
Would like people to have the opportunity to see moose in the wild in NYS	67.6	64.6	72.8	86.8	86.0
People should have the opportunity to hunt moose, if the moose population gets large enough in NYS	42.1	33.1	58.3	65.5	59.2
Disagree that people should have the opportunity to hunt moose, if the moose population gets large enough in NYS	40.9	49.4	25.8	17.1	22.8
Concerns about moose (moderately or very concerned)					
The possibility of moose-vehicle collisions occurring in NYS	30.0	32.3	25.8	52.1	53.5
Moose damage to forests and plants in NYS	16.7	21.6	8.3	19.1	15.5
The moose population in NYS might decline in the coming years	36.0	37.1	34.1	58.9	64.7
Desired moose population trend in NYS					
Decrease	2.4	3.3	1.0	1.3	1.6
Stay the same	24.1	25.8	21.0	19.3	16.3
Increase	31.7	26.3	41.3	58.9	67.6
No opinion	41.8	44.6	36.8	20.5	14.5

to factors related to climate change. Industrial forestland managers were more concerned about an increase in the population, similar to what they had seen in Vermont, New Hampshire, and Maine in the past.

A substantial proportion of the general public did not have an opinion (42%) about whether they would like to see the moose population increase, decrease or stay the same in NYS (Table 19). Among those who did have an opinion, and among those in the core and peripheral moose ranges, the majority wanted to see an increase and very few wanted a decrease.

IMPLICATIONS FOR A DEC MOOSE MANAGEMENT PLAN

Given the current moose population or a hypothetical increased population in the future, landowners would generally support non-lethal actions to increase the benefits of having moose (e.g., promotion of moose viewing opportunities which might benefit the local economy) and address potential concerns (e.g., increased signage and reducing speed limits where moose-vehicle collisions might occur). Those who trusted the information provided by scientists about moose, and DEC's ability to manage moose were more likely to support these non-lethal actions. Support for these actions increases if people perceive the non-hunting benefits of moose and/or are concerned about negative impacts to moose such as disease, parasites, or a declining moose population.

If the moose population increased, in addition to general support for non-lethal actions, there would be increased support for lethal actions among landowners in the core and peripheral moose ranges. Two-thirds of core area landowners and almost three-quarters of peripheral area landowners would support the establishment of a moose hunting season to manage moose numbers. Fewer respondents (50-58%) would support DEC issuing nuisance permits to shoot moose on properties with too much damage to young forests; one-quarter to one-third would oppose it. Perceiving hunting as a benefit of moose was the most important variable in explaining support for these actions. The difference in level of support between these two options (hunting season versus nuisance permits) could be linked people's perception of the availability of hunting opportunities to the general population of hunters, or perhaps the previously discussed lack of concern related to moose damage to forests. In our discussions with large industrial forestland managers, several suggested issuing nuisance permits as a first step in addressing some of the damage they were experiencing in "hot spots." Having a better understanding of the reasons for the difference in support for the lethal actions might be helpful before implementing either option.

Most New Yorkers do not want to see the moose population decrease, but if it happened the majority of core and peripheral area landowners would support four of the five management actions we asked about (increased funding for research to better understand the decline,

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moving moose from areas where they are plentiful to areas with good habitat but fewer moose, encouraging landowners to improve moose habitat, and lessening restrictions on timber cutting practices on private land in the Adirondack Park so more young forest can be created). The most important factors explaining support for the first three actions were trust in DEC and scientists, agreement that moose provide non-hunting benefits, and concern about the negative impacts on moose, such as disease and parasites. Support for the fourth action (lessening restrictions on timber cutting) was correlated with human/economic beliefs such as the belief that humans have the right to modify the natural environment and the best government is the one that governs the least. The least supported (40-43%) and most opposed (30-32%) action was to reduce the number of deer in core moose habitat to reduce parasites that are spread to moose by deer. Opposition to this action was more likely among those who had hunted in the past year, suggesting concern for a potential loss of deer hunting opportunities. Some of the large private forestland owners and managers we spoke with would be willing to do more clearcutting to provide food for moose; others would not.

Trust in DEC and trust in information coming from scientists were important factors in explaining support for almost all possible management actions. This finding suggests that as management planning proceeds efforts taken by DEC to share information from scientists and considerations in management decisions might build trust and support for eventual management actions. We found that providing information on scientific uncertainty did not influence support for management actions in this study, which could be because uncertainty is not important to most people in this context, perhaps because many trust DEC to manage moose even under conditions of uncertainty, or it could be that we failed to present the information in a way that prompted people to consider it.

Regardless of the future moose population trend, core and peripheral area landowners along with large private forestland owners and managers want DEC to continue monitoring the population and conducting research on moose. Many large landowners indicated they would welcome DEC and other researchers on their land.

LITERATURE CITED

Archie, K. M., L. Dilling, J. B. Milford, and F. C. Pampel. 2012 Climate change and western public lands: a survey of U.S. federal land managers on the status of adaptation efforts. Ecology and Society 17(4):20.

Connelly, N.A., T.B. Lauber, and R.C. Stedman. 2017 The NYSDEC Endangered Species Program: Public Awareness and Support. HDRU Publ. No. 17-11. Dept. of Nat. Resources, Coll. Agric. and Life Sci., Cornell Univ., Ithaca, N.Y. 62pp.

Connelly, N.A., T.B. Lauber, R.C. Stedman, and H. Kretser. 2020 Attitudes towards moose among large private forestland owners and managers in Northern New York. Center for Conservation Social Sciences Publ. Series 20-1. Dept. of Nat. Resources., Coll. Agric. and Life Sci., Cornell Univ., Ithaca, NY. 25 pp.

Connelly, N.A., T.B. Lauber, R.C. Stedman, and H. Kretser. 2019 Public awareness of and attitudes toward moose in New York State. Center for Conservation Social Sciences Publ. Series 19-5. Dept. of Nat. Resources., Coll. Agric. and Life Sci., Cornell Univ., Ithaca, NY. 17 pp.

Knight, A. J. 2008 "Bats, snakes, and spiders, Oh my!" How aesthetic and negativistic attitudes, and other concepts predict support for species protection. Journal of Environmental Psychology 28:94-103.

Kretser, H.E., M.J. Glennon, and Z. Smith. 2014 NGOs Enhance State Wildlife Agencies' Capacity to Meet Public Trust Doctrine Obligations, Human Dimensions of Wildlife: An International Journal 19: 437-447.

Lenarz, M.S., J. Fieberg, M. W. Schrage, and A. J. Edwards. 2010 Living on the edge: viability of moose in northeastern Minnesota. Journal of Wildlife Management 74(5): 1013-1023.

Murray, D. L., W. Cox, W. B. Ballard, H. A. Whitlaw, M. S. Lenarz, T. W. Custer, T. Barnett, and T. K. Fuller. 2006 Pathogens, nutritional deficiency, and climate influences on a declining moose population. Wildlife Monographs 166: 1-30.

Murray, D.L., K.F. Hussey, L.A. Finnegan, S.J. Lowe, G.N. Price, J. Benson, K.M. Loveless, K.R. Middel, K. Mills, D. Potter, A. Silver, M-J. Fortin, B.R. Patterson, P.J. Wilson. 2012 Assessment of the statue and viability of a population of moose (Alces alces) at its southern range limit in Ontario. Canadian Journal of Zoology 90: 422-434.

New York State Department of Environmental Conservation (NYSDEC). 2015 New York State Wildlife Action Plan. https://www.dec.ny.gov/animals/7179.html. Accessed 26 March 2020.

Rickards, L., J. Wiseman, T. Edwards, and C. Biggs. 2014 The problem of fit: scenario planning and climate change adaptation in the public sector. Environment and Planning C: Government and Policy 32:641-662.

Rines, K. What's bugging our moose? Wildlife Journal. November-December 2014 p. 4-7.

Stedman, R. C. 2004 Risk and climate change: Perceptions of key policy actors in Canada. Risk Analysis 24(5):1395-1406.

Your Opinions on Moose
in New York State

Center for Conservation Social Sciences
Department of Natural Resources
Cornell University

Your Opinions on Moose in New York State

Research conducted by the
Center for Conservation Social Sciences
Department of Natural Resources
Cornell University

in cooperation with the
New York State Dept. of Environmental Conservation (DEC)

The New York State Department of Environmental Conservation (DEC) asked Cornell to survey landowners about their interest in moose that live in New York State. We would like to know if you have seen moose in New York and how you feel about having moose in the area. We are also interested in your opinions about actions DEC or others might take now or in the future to manage moose in New York.

Even if you have never seen a moose in New York, or have little interest in moose, we would still like to hear your views. We want the results of the survey to reflect the interests of all landowners.

Please complete this questionnaire as soon as you can, seal it with the white re-sealable label provided, and drop it in any mailbox; *return postage has been pre-paid*. Your participation is voluntary, but we sincerely hope you will take just a few minutes to answer our questions. Your identity will be kept confidential and the information you give us will never be associated with your name.

THANK YOU FOR YOUR HELP!

1. Before receiving this survey, did you know that moose lived in some parts of New York?

☐ No (SKIP TO QUESTION 7)

☐ Yes

2. About how many moose do you think there are in New York State today? *(Circle one.)*

<100   100-500   500-1,000   >1,000   Don't Know

3. Have you ever seen a moose in New York? *(Check all that apply.)*

☐ No (SKIP TO QUESTION 5)

☐ Yes, in the past 5 years (2015-2019)

☐ Yes, before 2015

4. Where have you seen moose in New York? *(Check all that apply.)*

☐ On my property

☐ On or near a public road

☐ In a marshy area, bog, or by a lake

☐ In the woods

☐ In an open field

☐ Near buildings

5. Have you ever seen what you thought was evidence or sign of moose (tracks, scat, etc.) in New York?

☐ No

☐ Yes

IF YOU HAVE NEVER SEEN A MOOSE OR EVIDENCE OF MOOSE IN NEW YORK, SKIP TO QUESTION 7.

6. **Overall have your experiences with moose in New York been positive or negative?** *(Circle one.)*

| Very positive | Somewhat positive | Neither positive or negative | Somewhat negative | Very negative |

7. **How strongly do you agree or disagree with the following statements:** *(Check one box for each statement.)*

	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
I like knowing that moose live in New York State	☐	☐	☐	☐	☐
I would like people to have the opportunity to see moose in the wild in New York State	☐	☐	☐	☐	☐
I think people should have the opportunity to hunt moose, if the moose population gets large enough in New York State	☐	☐	☐	☐	☐
I think the presence of moose benefits the rural New York economy	☐	☐	☐	☐	☐
I would like to see a moose in the wild	☐	☐	☐	☐	☐
I think moose play an important role in nature	☐	☐	☐	☐	☐

8. How concerned are you about the following things happening: *(Check one box for each item.)*

	Not at all concerned	Slightly concerned	Moderately concerned	Very concerned	No opinion
The possibility of moose-vehicle collisions occurring in New York State	☐	☐	☐	☐	☐
Moose damage to forests and plants in New York State	☐	☐	☐	☐	☐
The moose population in New York State might decline in the coming years	☐	☐	☐	☐	☐
Moose threatening or being aggressive toward people	☐	☐	☐	☐	☐
Moose might suffer from parasites or diseases carried by other animals	☐	☐	☐	☐	☐
Moose might impact the habitat of other species I care about (e.g., birds)	☐	☐	☐	☐	☐

9. Generally, how do you feel about moose in New York?

☐ I enjoy moose and I do not worry about problems they may cause

☐ I enjoy moose but I worry about problems they may cause

☐ I do not enjoy moose and I regard them as a nuisance

☐ I have no particular feelings about moose

10. How would you like the moose population in New York State to change in the coming years?

☐ Decrease

☐ Stay the same

☐ Increase

☐ No opinion

Questions 11-13 present information about the impacts moose are having in New York currently and potentially could have in the future. Please think about possible actions DEC or others might take to manage moose and their impacts given each situation.

11. The current situation:
- **Some people have seen moose or signs of moose and enjoy that experience.**
- **Approximately 10-20 moose-collisions occur per year in New York State. Because of the size of moose, collisions can cause extensive damage including injuries to people.**
- **Moose spend much of their time on private, forest land eating young trees which can prevent the trees from growing into harvestable timber.**
- **Scientists are unsure whether the moose population will increase, decrease, or stay the same in the future.**

Given the kinds of impacts moose are having in New York today, how strongly would you support or oppose the following actions? *(Check one box for each item.)*

	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Increase signage where moose-vehicle collisions might occur	☐	☐	☐	☐	☐
DEC issues nuisance permits to shoot moose on properties with too much damage to young forests	☐	☐	☐	☐	☐
Establish a moose hunting season to manage moose numbers	☐	☐	☐	☐	☐
Promote moose viewing opportunities, which might benefit the local economy	☐	☐	☐	☐	☐
Increase funding for research to better understand New York's moose population	☐	☐	☐	☐	☐
Reduce speed limits where moose-vehicle collisions might occur	☐	☐	☐	☐	☐

12. A potential future scenario:

- **The moose population has increased and expanded out from the Adirondack Park where most of the moose currently live.**
- **People have more opportunities to see moose, both inside the park and in surrounding areas.**
- **The local economy benefits from people who come to see moose.**
- **The chances of moose-vehicle collisions are greater.**
- **The damage to young trees is more intense and widespread making it harder for more people to grow trees into harvestable timber.**
- **With the larger moose population, parasites will more easily spread among the moose. Scientists are unsure if this will eventually reduce the moose population.**

If moose had these kinds of impacts in New York in the future, how strongly would you support or oppose the following actions? *(Check one box for each item.)*

	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Increase signage where moose-vehicle collisions might occur	☐	☐	☐	☐	☐
DEC issues nuisance permits to shoot moose on properties with too much damage to young forests	☐	☐	☐	☐	☐
Establish a moose hunting season to manage moose numbers	☐	☐	☐	☐	☐
Promote moose viewing opportunities to try to increase benefits for the local economy	☐	☐	☐	☐	☐
Increase funding for research to better understand New York's moose population	☐	☐	☐	☐	☐
Reduce speed limits where moose-vehicle collisions might occur	☐	☐	☐	☐	☐

13. Another potential future scenario:
- **The moose population has decreased because of natural factors.**
- **People have fewer opportunities to see moose.**
- **The chances of moose-vehicle collisions are lower.**
- **Damage to young trees has decreased, making it easier for most people to grow trees into harvestable timber.**
- **Deer in New York carry parasites that kill moose, which could further jeopardize the moose population.**
- **Scientists are unsure whether the moose population will be able to survive in New York.**

If moose had these kinds of impacts in New York in the future, how strongly would you support or oppose the following actions? *(Check one box for each item.)*

	Strongly oppose	Somewhat oppose	Neither oppose nor support	Somewhat support	Strongly support
Reduce the number of deer in core moose habitat to reduce parasites that are spread to moose by deer	☐	☐	☐	☐	☐
Encourage landowners to improve moose habitat	☐	☐	☐	☐	☐
Move moose from areas where they are plentiful to areas with good habitat but fewer moose	☐	☐	☐	☐	☐
Increase funding for research to better understand the decline in New York's moose population	☐	☐	☐	☐	☐
Lessen restrictions on timber cutting practices on private land in the Adirondack Park, so more young forest (ideal moose habitat) can be created	☐	☐	☐	☐	☐

14. **How strongly do you agree or disagree with the following statements?** *(Check one box for each statement.)*

	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
I trust DEC to make decisions about how to manage moose	☐	☐	☐	☐	☐
DEC understands which factors to consider when deciding how to manage moose	☐	☐	☐	☐	☐
I trust information about moose coming from scientists	☐	☐	☐	☐	☐

BACKGROUND INFORMATION

15. **Have you participated in any of the following activities in the past year:** *(Check all that apply.)*

☐ Hiking

☐ Camping

☐ Boating, either in a motorized or non-motorized boat

☐ Watching birds or wildlife

☐ Fishing

☐ Hunting

16. **In what year were you born:** _____

17. What is your gender: *(Check one.)*

☐ Male   ☐ Female

18. Which category best describes the place where you currently reside for most of the year? *(Check one.)*

☐ A rural area, outside a village or hamlet

☐ Village or hamlet (less than 10,000 people)

☐ Small city (10,000 to 50,000 people)

☐ Large city (over 50,000)

19. How strongly do you agree or disagree with the following statements? *(Check one box for each statement.)*

	Strongly disagree	Somewhat disagree	Neutral	Somewhat agree	Strongly agree
Humans must live in harmony with nature in order to survive	☐	☐	☐	☐	☐
Plants and animals exist primarily to be used by humans	☐	☐	☐	☐	☐
The balance of nature is very delicate and easily upset	☐	☐	☐	☐	☐
When humans interfere with nature, it often produces disastrous consequences	☐	☐	☐	☐	☐
Humans have the right to modify the natural environment	☐	☐	☐	☐	☐
Humankind was created to rule over the rest of nature	☐	☐	☐	☐	☐
The best government is the one that governs the least	☐	☐	☐	☐	☐
Most environmental problems can be solved by applying more and better technology	☐	☐	☐	☐	☐

20. What is the highest level of education you have completed?

- ☐ Less than high school
- ☐ High school diploma / G.E.D.
- ☐ Some college or technical school
- ☐ Associate's (2 year) degree
- ☐ College undergraduate degree (e.g., B.A., B.S.)
- ☐ Graduate or professional degree (e.g., M.S., Ph.D., M.D., J.D.)

21. In general, do you think of yourself as…

- ☐ Very liberal
- ☐ Somewhat liberal
- ☐ Moderate/Middle of the road
- ☐ Somewhat conservative
- ☐ Very conservative

Please use the space below for any comments you wish to make.

Thank you for your time and effort!

To return this questionnaire, simply seal it with the white removable seal, and drop it in the mail (return postage has been paid).

APPENDIX B: NON-RESPONDENT TELEPHONE FOLLOW-UP

1. First, before receiving our survey, did you know that moose lived in some parts of New York State?
____No (SKIP to Q5)
____Yes

2. Have you ever seen a moose in New York?
____No
____Yes

3. Have you ever seen what you thought was evidence or sign of moose, like tracks or scat, in New York?
____No
____Yes

If Q2 is "No" and Q3 is "No", skip to Q5.
4. Overall have your experiences with moose in New York been positive or negative? Would you say they have been:

_____ Very positive
_____ Somewhat positive
_____ Neither positive or negative
_____ Somewhat negative
_____ Very negative

5.   How strongly do you agree or disagree with the following statements:

   a. I like knowing that moose live in New York State

_____ Strongly agree
_____ Agree
_____ Neutral
_____ Disagree
_____ Strongly disagree

   b. I would like people to have the opportunity to see moose in the wild in New York State

_____ Strongly agree
_____ Agree
_____ Neutral
_____ Disagree
_____ Strongly disagree

      c.   **I think people should have the opportunity to hunt moose, if the moose population gets large enough in New York State.**

_____ Strongly agree
_____ Agree
_____ Neutral
_____ Disagree
_____ Strongly disagree

6.   **How concerned are you about the possibility of moose-vehicle collisions occurring in New York State?**

_____ Not at all concerned
_____ Slightly concerned
_____ Moderately concerned
_____ Very concerned
_____ No opinion

7.   **How concerned are you about moose damage to forests and plants in New York State?**

_____ Not at all concerned
_____ Slightly concerned
_____ Moderately concerned
_____ Very concerned
_____ No opinion

8.   **How concerned are you that the moose population in New York State might decline in the coming years?**

_____ Not at all concerned
_____ Slightly concerned
_____ Moderately concerned
_____ Very concerned
_____ No opinion

9.   **How would you like the moose population in New York State to change in the coming years?**

_____ Decrease
_____ Stay the same
_____ Increase
_____ No opinion

10. One final question, in what year were you born?   _____

Thank you very much for taking the time to talk with me.

END INTERVIEW

Record Gender: _____ Male _____ Female

APPENDIX C: ADDITIONAL TABLES

Appendix Table C-1. Tests for non-response bias.

	Percent			
	Core area landowners		Peripheral area landowners	
Questions	Respondents	Non-respondents	Respondents	Non-respondents
Aware moose live in NYS				
No	3.1	10.0	3.8	8.0
Yes	96.9	90.0	96.2	92.0
		NS		NS
Seen a moose in NYS				
No	46.2	60.0	54.0	54.3
Yes	53.8	40.0	46.0	45.7
		NS		NS
Seen evidence of moose in NYS				
No	55.3	55.6	67.5	65.2
Yes	44.7	44.4	32.5	34.8
		NS		NS
Population trend desired				
Decrease	1.6	0.0	1.3	2.0
Stay the same	16.3	22.0	19.3	16.0
Increase	67.6	54.0	58.9	44.0
No opinion	14.5	24.0	20.5	38.0
		NS		$(x^2=8.7, df=2, p=0.01)$[a]
Gender				
Male	67.3	52.0	68.7	48.0
Female	32.7	48.0	31.3	52.0
		$(x^2=5.0, df=1, p=0.03)$		$(x^2=9.2, df=1, p=0.002)$

	Mean			
	Core area landowners		Peripheral area landowners	
Questions	Respondents	Non-respondents	Respondents	Non-respondents
Overall positive or negative experience with moose (for those with experience)*	1.24	1.08	1.07	0.88
		NS		NS
Benefits of having moose**				
I like knowing that moose live in NYS	4.54	4.24	4.47	3.98
	(t=2.5, df=57, p=0.01)		(t=3.4, df=53, p<0.001)	
I would like people to have the opportunity to see moose in the wild in NYS	4.45	4.26	4.46	4.30
		NS		NS
I think people should have the opportunity to hunt moose, if the population gets large enough in NYS	3.61	3.74	3.80	3.58
		NS		NS
Concerns about having moose***				
The possibility of moose-vehicle collisions occurring in NYS	2.66	2.72	2.65	2.30
		NS		(t=2.0, df=47, p=0.02)
Moose damage to forests and plants in NYS	1.60	1.40	1.76	1.34
		NS		(t=4.4, df=69, p<0.001)
The moose population in NYS might decline in the coming years	2.97	2.62	2.86	2.31
	(t=1.9, df=38, p=0.03)		(t=2.7, df=36, p=0.004)	
Age	63.4	65.6	63.1	59.9
		NS		NS

[a]Combined "decrease" and "stay the same" categories in chi-square test.

*Experience was measured on a scale from -2=very negative to 2=very positive.

**Agreement with the benefit statements was measured on a scale from 1=strongly disagree to 5=strongly agree.

***Concern was measured on a scale from 1=not at all concerned to 4=very concerned.

Appendix Table C-2. Variables most likely to be impacted by gender bias shown unweighted and weighted as if the sample was 50% male and 50% female.

	Percent	
	Unweighted data	Data weighted for 50/50 gender
Feelings about moose		
I enjoy moose and <u>do not worry</u> about problems they may cause	61.3	60.5
I enjoy moose but I <u>worry</u> about problems they may cause	23.3	23.0
I <u>do not enjoy</u> moose and I regard them as a nuisance	1.0	0.8
I have no particular feelings about moose	14.5	15.7
Population trend desired		
Decrease	1.5	1.4
Stay the same	17.7	18.9
Increase	63.5	60.3
No opinion	17.3	19.4
DEC issues nuisance permits to shoot moose on properties with too much damage to young forests		
Support	43.7	41.2
Neither support nor oppose	19.1	19.7
Oppose	37.1	39.1
Establish a moose hunting season to manage moose numbers		
Support	58.3	54.7
Neither support nor oppose	18.4	20.0
Oppose	23.2	25.2
Went fishing in past year	45.0	39.7
Went hunting in past year	32.0	25.8