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## **Attitudes Toward Beaver and Norms About Beaver Management: Insights from Baseline Research in New York**



Photo: C. Henner, USGS - Massachusetts Cooperative Fish and Wildlife

**July 2004**

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**Key Words:** attitudes, beaver, damage, norms, tolerance, trapping, wildlife stakeholder  
acceptance capacity

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## INTRODUCTION

The focus of beaver management in New York State has shifted over time in response to changes in beaver populations. Beaver management focused on species recovery in the early 1900s. By the 1940s, beaver numbers had increased dramatically due to harvest restriction, habitat recovery, and a successful trap and transfer program (Bishop et al. 1992). In 1944, beaver management policy shifted from a goal of population recovery to a goal of limiting problems caused by beaver (Bishop et al. 1992). For three decades, wildlife managers established fur-trapping seasons to keep beaver populations at low levels in most of the state. New York revised beaver management policies again in the 1970s to allow for regulated growth of beaver populations in areas where they were formerly suppressed. The goal of this policy was to increase the wetland wildlife benefits associated with beaver colonies (Bishop et al. 1992).

In the 1980s, restricted beaver harvest regulations and a drop in beaver pelt prices contributed to increases in New York's beaver population. High beaver populations often result in frequent interactions – including negative interactions -- between beaver and people in residential areas. Negative interactions can lead to an increase in the number of complaints residents make to government officials about beaver-related problems (e.g., flooding, water contamination, tree damage). The beaver population increase that took place in the 1980s was indeed accompanied by a rise in nuisance beaver complaints. For example, in 1975, the New York State Department of Environmental Conservation (DEC) documented 706 complaints about nuisance beaver, compared to over 1,700 nuisance beaver complaints in 1990 (Jensen et al. in press). Beaver trapping seasons were liberalized in the early 1990s, but the market value of beaver pelts was low at that time and beaver harvest remained below management goals. By the mid-1990s, DEC was receiving approximately 2,500 nuisance beaver complaints annually. Jensen et al. (in press) analyzed the 10,879 nuisance beaver complaints DEC received between 1993 and 1997. Complaints were classified as damage to: public roads (28%); private roads (11%); railroads (3%); agriculture (12%); timber (10%); impoundments (14%); residential property (13%); or “other” (9%) (Jensen et al. in press). The number of nuisance beaver complaints remained high in the mid-1990s, despite increased pelt prices and an average annual harvest of more than 28,000 beaver. However, beaver pelt prices and beaver harvest dropped precipitously at the end of the 1990s. Wildlife managers in New York have expressed concern that this will once again lead to an increase in beaver numbers and beaver human conflicts (NYSDEC 2000).

The relationship between beaver population size and complaints about beaver problems is particularly well documented in Massachusetts. The beaver population grew rapidly through the 1990s. The number of beaver-related complaints doubled between 1993 and 1996 (Horwitz 1996). In November 1996, Massachusetts voters approved a ballot initiative, commonly referred to as “Question One,” that established the Wildlife Protection Act. Among other things, this act eliminated the legal use of foothold traps and restricted use of body-gripping traps (snap traps excepted). The immediate effect of the Wildlife Protection Act was to restrict the ability of the Massachusetts Division of Fisheries and Wildlife (MassWildlife) to manage populations of beaver. The statewide beaver population was estimated at 24,000 animals in 1996 (Horwitz 1996), the year the Wildlife Protection Act was passed. The beaver population was estimated in excess of 52,000 in 1999 (MassWildlife press release, April 9, 1999), and is now estimated to

exceed 70,000 (MassWildlife 2004). Beaver have extended beyond their historic range in Massachusetts and occupy the state at a record high level (Chrissie Henner, MassWildlife, personal communication). In 2000, the Massachusetts Legislature modified the Wildlife Protection Act, making it possible for people to obtain permits from their local town Board of Health to use body gripping traps, breach dams, or install water control devices to solve public health or safety problems due to beaver activity. This has effectively shifted beaver management authority from MassWildlife to local health boards.

Wildlife managers in New York and Massachusetts have expressed concern that positive attitudes toward beaver might decline when negative human-beaver interaction increases in residential areas (Bishop et al. 1992, Jackson and Decker 1995). Such a shift in attitudes would have important implications for wildlife management. For example, if negative interactions exceed tolerable levels, community support for wildlife, wildlife management agencies, and habitat conservation may be reduced. Because of these concerns, the New York State Department of Environmental Conservation (DEC) has sponsored periodic research to measure and understand beaver damage tolerance (Enck et al. 1988, 1992, 1996; Purdy and Decker 1985).

In light of these trends, the Northeast Furbearer Resources Technical Committee (NFRTC) identified a need to monitor public attitudes and perceptions related to beaver and beaver management in Massachusetts, where use of traditional trapping is restricted as a beaver management tool. This recommendation was accepted by the Northeast Wildlife Administrators Association, and in 2000 they sought out funding for independent, coordinated beaver management studies in two states: Massachusetts and New York. The Division of Federal Aid of the U.S. Fish and Wildlife Service provided funding for research in Massachusetts. The Massachusetts Division of Fisheries and Wildlife (MassWildlife) agreed to cooperate in the Massachusetts study so that biological status information on beaver could be coupled with the human dimension aspect of the study. University of Massachusetts, Amherst staff conducted the research in Massachusetts. The DEC Bureau of Wildlife (BOW) agreed to cooperate in the project by funding companion research in New York State. Staff at Cornell's Human Dimensions Research Unit partnered with UMass staff to design the study, and implemented data collection efforts in New York.

The study we report here is part of a joint effort by DEC and several partners [see acknowledgments] to understand how attitudes about and tolerance for beaver may change in the face of increasing levels of beaver-related problems.

### **Purpose and Organization of this Report**

We undertook this research to improve understanding of the factors that influence beaver-related attitudes, norms, and tolerance in suburbanized landscapes. The primary goal of this research is to help wildlife managers understand and predict long-term conservation implications associated with increases in beaver populations and restriction of beaver management approaches.

The purpose of this report is to provide a comprehensive set of results from the New York portion of the 2002 New York – Massachusetts beaver management study (for a report of

findings from the Massachusetts portion of the study see Jonker [2003]). We collected data from random samples of people living in two small geographic areas and from a statewide random sample of people who had filed a complaint with DEC about beaver in 1999 or 2000.

Throughout the report, we compare results obtained from respondents in these three groups. Using this approach allows us to: (1) improve understanding of the individuals who contact DEC with a nuisance beaver complaint, and (2) test hypotheses about the relationship between attitudes, norms, and personal experience with beaver-related problems.

The data described here and in Jonker (2003) will serve as a baseline for a series of studies, to be repeated periodically in both New York and Massachusetts. Our intended audience for this report includes wildlife management professionals and others interested in beaver management in the northeast.

The body of this report includes a section on research methods, results and discussion, management implications, and future research plans. Most of the report takes the form of a set of appendices containing information about study design, survey instruments, and detailed results across strata. These appendices will serve as a document of record for the wildlife managers and researchers who replicate this work in New York or Massachusetts.

### **Study objectives**

We identified several study objectives that fall under the two headings listed below.

1. Collect baseline data for a longitudinal study to assess change in attitudes toward wildlife management given different levels of beaver damage and different management approaches.
  - a. Measure attitudes toward beaver, beaver problem tolerance, norms toward beaver management, and wildlife value orientations in New York and Massachusetts.
2. Test the null hypotheses that people's tolerance for beaver, attitudes toward beaver, and norms about beaver management do not change as conflicts with beaver increase.
  - a. Compare tolerance, attitudes, and norms among groups within each state who have experienced different levels of beaver damage.
  - b. Compare tolerance, attitudes, and norms among groups in both states who have experienced different levels of beaver damage.
  - c. After future study replications: Assess change in tolerance, attitudes, and norms that takes place between 2002 and the date of the next study replication.

We achieved objective 1 by completing the 2002 baseline studies in New York and Massachusetts. Objective 2a is addressed in this report and in Jonker (2003). We address objective 2b in a forthcoming publication (Siemer et al., in preparation) that analyzes findings from New York in comparison to findings from Massachusetts. Objective 2c will be addressed after survey replication in New York and Massachusetts allows for comparison to the baseline data collected in 2002.

## **Hypotheses, Assumptions, and Management Implications**

Discussions within the Northeast Furbearer Resources Technical Committee led to the following null and alternative hypotheses about tolerance for human/beaver interactions and attitudes toward beaver:

Null Hypotheses (H<sub>1-2</sub>): *People's tolerance<sub>1</sub> for and attitudes<sub>2</sub> towards beaver do not change as negative interactions with beaver increase.*

Alternative Hypotheses (H<sub>3-4</sub>): *People's tolerance for beaver will decrease<sub>3</sub> and their attitudes towards beaver will become more negative<sub>4</sub> as negative interactions with beaver increase.*

Previous research has suggested that acceptability of different kinds of wildlife management actions can change as people experience a range of positive and negative interactions with the species in question. For example, researchers have documented increased support for lethal management as problem severity increases (Loker et al. 1999, West and Parkhurst 2002, Whittaker 2000, Wittman et al. 1998) In this study, we explore the following null and alternative hypotheses about acceptability of beaver management actions:

Null Hypotheses (H<sub>5</sub>): *People's acceptance of beaver management actions does not change as negative interactions with beaver increase.*

Alternative Hypotheses (H<sub>6</sub>): *People's acceptance of beaver management actions increases as negative interactions with beaver increase.*

### **Research questions addressed in this report**

We cannot fully address study objective 2 until a comparative study is completed. However, an analysis of the 2002 baseline data in New York allowed us to explore several interrelationships associated with objective 2a. We compared findings among strata and between respondents with different levels of beaver damage experience to address the following research question: what is the relationship between experience with beaver-related problems and (1) problem tolerance, (2) attitudes towards beaver, and (3) norms about beaver management?

## **METHODS**

### **The Survey Instrument**

We used a mail survey to collect data for this study. We designed our survey instrument (Appendix A) to explore the following topic areas: demographic characteristics, participation in wildlife-related activities, attitudes toward beaver, experiences with beaver damage, beaver problem tolerance, acceptability of various beaver management activities, wildlife value orientation, importance placed on obtaining wildlife-related benefits, and importance placed on avoiding wildlife-related costs.

We implemented a survey pretest in January-February, 2002. We sent the pretest questionnaire to a sample of 150 people in DEC region 6 (northern New York) who had filed a nuisance beaver complaint with DEC in 1999 or 2000. We also sent the pretest questionnaire to a random sample of 150 Massachusetts residents. All members of the pretest sample received an initial mailing and follow-up reminder letter. We received completed questionnaires from 69 people in New York and 33 people in Massachusetts. We combined all 102 useable returns for analysis. All the data from returned pretest questionnaires were entered and analyzed using SPSS software. We revised some items and dropped others based on pretest results.

## **Sampling and Survey Implementation**

Sampling approaches and survey implementation were similar in both New York and Massachusetts. We provide details about implementation of the study in New York in this section. Details about implementation in Massachusetts are provided in Appendix B.

Survey implementation occurred during April-May, 2002. We used a standard 4-wave implementation (i.e., the entire group received an initial mailing and follow-up reminder letter; nonrespondents received up to two additional reminder mailings).

We contacted a total sample of 2,400 people in three subgroups or strata. Stratum 1 was a random sample of 900 listed households in portions of Rensselaer and Washington counties defined by DEC as the Northern Taconic Aggregated Wildlife Management Unit (WMU) (see Figure 1). The Taconic stratum is representative of rural upstate areas with a low beaver density (in 2002 beaver density was 0.15 colonies/km<sup>2</sup>). Stratum 2 was a random sample of 900 listed households in portions of Fulton, Herkimer, Montgomery, Oneida, Saratoga, Schenectady, Schoharie, and Washington counties. DEC defines this area as the Mohawk Valley Aggregated WMU (see Figure 1). The Mohawk stratum is representative of mixed rural-suburban areas with a low beaver density (in 2002 beaver occupancy was 0.25 colonies/km<sup>2</sup>). We selected the Mohawk and Taconic WMU's because they had several characteristics that made them comparable to the sites in central and western Massachusetts. It is important to note that these study sites were selected to facilitate hypothesis testing, not to provide a representation of the state as a whole.

Stratum 3 was a statewide sample of 600 people who had contacted DEC with a beaver damage complaint in 1999 or 2000. The complainant stratum is representative of residential complainants statewide. Members of this subgroup were selected from agency records of complaints filed in 1999 and 2000 (the most recent years for which these data were available from both states). Only private residents were included in the complainant sample (i.e., we excluded complaints on behalf of a highway department, municipality, railroad, or place of business). This is important to note because those sources account for a substantial proportion of the total nuisance complainants in New York (Jensen et al. in press).

After adjusting for undeliverable questionnaires, the combined useable response rate for strata 1 and 2 was 38.1% (n=591) (1,800 sent out, 234 non-deliverable, 16 unusable returns, 591 useable returns). The adjusted response rate for stratum 3 (beaver damage complainants) was 76.7% ( 600 sent out, 24 non-deliverable, 442 useable returns).

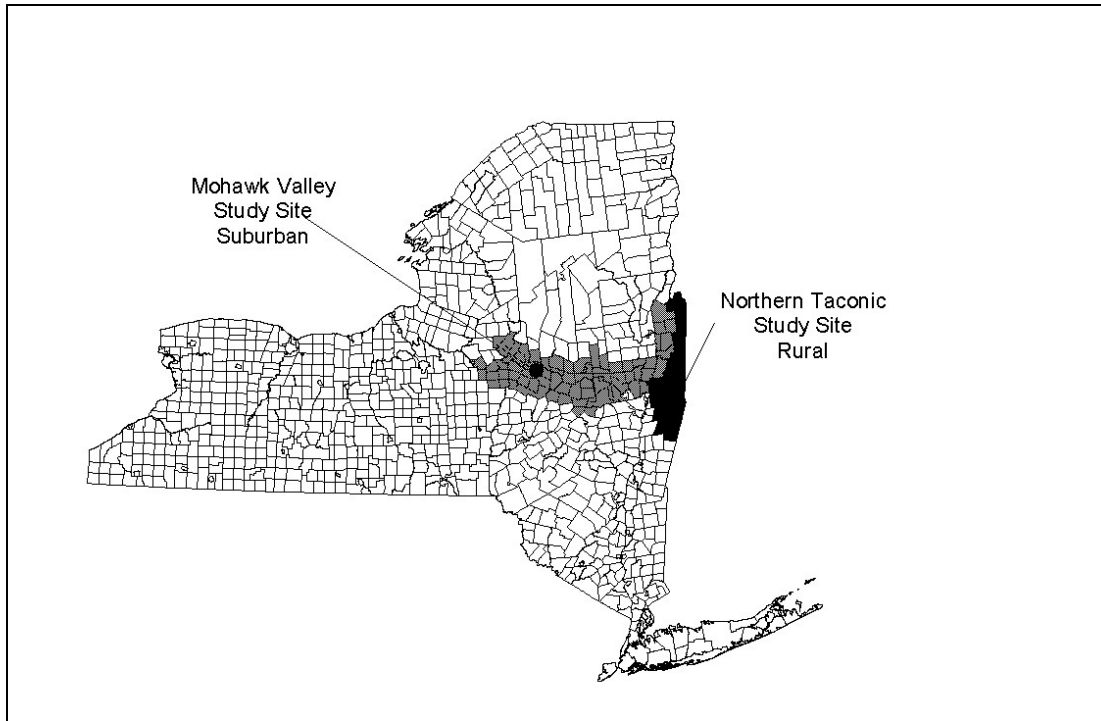


Figure 1. New York study areas.

Given that fewer than 40% of people in the two study areas responded, we conducted follow-up telephone interviews with a total of 100 nonrespondents from those strata. We did not include nuisance complainants as part of the follow-up study because they responded at a rate that minimized concerns about nonresponse bias. Using a computer-assisted telephone interviewing (CATI) system, the Cornell University Computer Assisted Survey Team (CAST) completed a short (less than 5-minute) follow-up telephone interview (Appendix C) with 100 nonrespondents from a pool of 973 nonrespondents in strata 1 and 2. CAST staff completed the interviews between June 5 and June 15, 2002. They had attempted to contact 618 people before they reached the target of 100 completed interviews (408 people were called but never reached, 77 people were unreachable at the telephone number provided in the database, 29 refused to be interviewed, and 4 were too ill to respond or deceased).

The follow-up study revealed significant differences between respondents and nonrespondents from the geographic strata. Respondents were more likely than nonrespondents to be male, participate in hunting or fishing, and have experienced a beaver-related problem (Appendix D). We anticipated low response rates from the general public samples and we oversampled to ensure that we would have adequate numbers of respondents to conduct all planned analyses. We decided not to adjust the data for potential nonresponse bias. Given our sampling strategy and the potential for nonresponse bias, these data should not be used to make generalizations about the prevalence of any given attitude, norm, or experience across New York State.

## **Measurement of Key Concepts**

We used independent t-tests and ANOVA to explore relationships between key variables, including experience with beaver damage, wildlife acceptance capacity, attitudes toward beaver, beaver-related effects and impacts, and norms toward different beaver management actions. For all comparisons we report differences at the 0.05 level of significance.

### **Experience with beaver problems:**

We asked people to report whether they had ever experienced a beaver-related problem at or around their home. Those who had experienced problems were asked to describe the type of problems experienced and the severity of those problems on a scale from 1 (“light”) to 5 (“severe”). We asked people to describe what, if any, actions they had taken to control property damage or other problems with beaver. We include seven response options that allowed us to place respondents in four categories: (1) no action; (1) nonlethal actions; (3) lethal actions; and (4) both nonlethal and lethal actions. Nonlethal response options included contacting DEC for information and installing water control devices. Lethal responses included contacting DEC for a permit to remove beaver or beaver dams and attempts to remove beaver by trapping.

### **Wildlife acceptance capacity:**

It is assumed that people desire a wildlife population decrease when their tolerance for wildlife-related problems has been exceeded. Because of this, population preference has been used as an indicator of a concept called wildlife acceptance capacity (WAC) (Decker 1991, Decker and Purdy 1988). WAC has been defined as the “maximum wildlife population level in an area that is acceptable to people” (Decker and Purdy 1988:53). WAC can be established for different stakeholder groups by establishing their stated preference for a wildlife population level.

We used a measure of beaver population preference as an indicator of WAC. We asked respondents to express their future population preference on a 9-point scale from “no beaver” to “at least twice as many beaver.” For purposes of analysis, we assumed that people prefer a decrease in the beaver population because their personal acceptance capacity for beaver has been exceeded.

Using population preference as a measure of acceptance capacity has recognized limitations (Minnis and Peyton 1995). Researchers have proposed the concepts of social carrying capacity (SCC) (Peyton et al. 2000) and wildlife stakeholder acceptance capacity (WSAC) (Carpenter et al 2000) to overcome those limitations. We decided not to measure SCC or WSAC in this study. Doing so would have required multiple items and would have extended the length of our questionnaire beyond what was desired, given all the topics we wanted to include in our questionnaire. We decided to accept the limitations inherent in the WAC approach because it provides information that wildlife managers find useful and it does so with a single item.

### **Perception of trend in beaver damage:**

We asked respondents to report their perception of whether beaver-related damage had increased, decreased, or remained the same across New York State over the previous 5 years. The response options ranged from “greatly increased” (1) to “remained the same (3) to “greatly decreased” (5). Respondents also could respond “no opinion” (6).

### **Attitudes toward beaver:**

The survey instrument contained nine attitude statements (i.e., *In the area where I live: beaver have a right to exist; beavers are a sign of a healthy environment; beaver populations should be left alone; no beaver should be destroyed; and residents should learn to live with some conflicts with beaver; beaver are a nuisance; beaver populations should be controlled; people don't want a wetland near their home because it could become a haven for beaver; and the presence of beaver makes it a burden to have a wetland near your home*). Respondents were asked to report their agreement with attitude statements on a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree).

### **Effects and impacts of beaver:**

A wide range of positive and negative effects are produced through interactions between beaver and people. Some effects – like the creation of beaver ponds – are easily recognized and well known to most stakeholders. Other effects are more difficult to recognize and may go unnoticed by stakeholders. We included a set of questionnaire items to assess whether respondents recognized that beaver can create four different categories of effects: ecological benefits, existence benefits, economic costs, and human health risks. We also asked respondents if they believed any of these effects were important enough to warrant management attention by DEC. That subset of effects that are recognized by stakeholders and regarded as being important can be defined as “impacts” (Riley et al. 2002, 2003). Assessing what stakeholders regard as impacts can help furbearer managers identify priorities for management attention in a given location.

Recognition of effects was measured with single item ratings on five-point bipolar scales anchored by “strongly agree” (1) and “strongly disagree” (5). Perceptions that a given impact was important enough to address through management were measured on the same five-point bipolar scales (anchored by “strongly agree” [1] and “strongly disagree” [5]).

### **Norms about beaver management interventions:**

Norms are beliefs about what others think one should do or how one should behave. Understanding norms about beaver management can help wildlife managers design management interventions that consider social acceptability along with other factors (e.g., biological feasibility, delivery costs, etc.). We developed a series of questions that examined norms toward nonlethal and lethal management responses to beaver. Our research design is informed by the efforts of Zinn et al. (1998), Wittman et al. (1998), and Manfredo et al. (1999) to explore norms about management of beaver, coyote, and mountain lion.



Normative beliefs were measured as beliefs about the acceptability of certain management actions toward beaver in different situations. Respondents were asked to respond to four levels of incident extremity (severity of an encounter with beaver): (1) “seeing a beaver in my yard,” (2) “a beaver floods a public road,” (3) “a beaver damages my private property (trees, well, etc.),” and (4) “a beaver carries a disease that is harmful to humans.” For each level of incident extremity, respondents rated the acceptability of three levels of management response (response extremity): (1) taking no immediate action, (2) installing drainage pipes to control water levels behind a beaver dam, and (3) lethal control of beaver. Acceptability was measured with single item ratings on five-point bipolar scales anchored by “strongly agree” (1) and “strongly disagree” (5). For more detail about norms and how we analyzed norms in this study we refer readers to Jonker (2003).

## **RESULTS<sup>1</sup>**

When interpreting survey results, it is important to keep in mind the demographic groups represented by respondents. The majority of respondents (75%) were male. Most (90% or more) were home owners and the mean age for all subgroups was over 50 years old. The median household income for respondents was \$30,000 - \$60,000 (Table 1). On average, respondents had lived in the same township for over 25 years (Table 2). The majority of respondents in all subgroups had participated in wildlife viewing in the previous year and many defined themselves as anglers (Table 3). Respondents participated in wildlife-related activities at rates that exceeded statewide averages. For example, the U.S. Fish and Wildlife Service estimated that, in 2001, participation in hunting, fishing, and wildlife watching among New York State residents 16 years of age or older was 5%, 9%, and 25%, respectively (USDI 2003).

We found no difference between Mohawk and Taconic strata respondents with regard to age, sex, home ownership, household income, or participation in hunting or fishing. We found statistical differences among respondents in the Mohawk, Taconic, and beaver damage stratum on some background characteristics. For example, in comparison to other subgroups, damage complainants were more likely to hunt and own a home (Table 1, 3). However, these differences may be of little practical significance. We found that background characteristics such as sex and age explained little of the variance observed across attitudes and norms.

### **Experiences with Beaver Damage**

Personal experience with beaver-related problems varied across study sites. About 11% of Mohawk Valley respondents and 22% of Taconic respondents had experienced a problem with beaver. Nearly all respondents in the nuisance complaint strata had personal experience with beaver-related problems (a few had contacted their state wildlife agency with questions or concerns about beaver, but had not actually experienced property damage or other problems) (Table 4).

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<sup>1</sup> This report focuses on results from the New York State portion of the New York – Massachusetts beaver management study. For comparative results for Massachusetts study sites see Jonker (2003).

On average, respondents who had suffered beaver damage in the Taconic or Mohawk samples characterized the damage events as relatively light, and the majority of respondents who had experienced damage in those areas had taken no action in response to beaver damage. Respondents who contacted DEC with a nuisance beaver complaint were more likely than respondents in other stratum to characterize their beaver damage as severe. The majority of complainants had taken both nonlethal and lethal actions to control beaver damage (Table 4).

The most frequently experienced problems among respondents were: damage to individual trees or woodlots, plugged culvert pipes, and damage to private ponds or lakes (Table 5). As one might expect, the proportion of respondents who had experienced any given type of problem was often higher among complainants than among respondents in the Mohawk or Taconic sample areas (Table 5). For example, 81% of complainants had experienced damage to trees or woodlots; 47% of Mohawk respondents and 67% of Taconic respondents had experienced the same type of problem.

### **Beaver Population Preferences (wildlife acceptance capacity)**

Beaver population preference (our measure of wildlife acceptance capacity) was similar in the Mohawk and Taconic study areas. About half the respondents in both study areas wanted no change in the beaver population (Table 6). Acceptance capacity was significantly lower among nuisance complainants than among respondents in the Mohawk or Taconic strata. The majority of nuisance complainants preferred a beaver population decrease (Table 6). Respondents in all groups were likely to perceive that beaver damage had increased statewide in the preceding 5 years, but complainants were the group most likely to hold this perception (Table 7).

Mean wildlife acceptance capacity was highly correlated with beaver damage experience (Table 8). Only 20% of respondents who had never experienced a problem with beaver preferred a beaver population decrease, while 65% of those who had experienced problems preferred a beaver population decrease. Among respondents who had experienced beaver damage, we observed a pattern of decline in wildlife acceptance capacity as perceived severity of damage increased (Table 9). The results shown in Table 10 demonstrate that this pattern appears whether the type of damage is related to flooding of a private road or drive, damage to trees or woodlots, or plugged culvert pipes.

For all samples combined, respondents with low wildlife acceptance capacity were more likely to have taken lethal or both lethal and nonlethal actions to address beaver-related problems (Table 11). In addition, acceptance capacity was lower among respondents who believed that the level of beaver damage in their state had increased in the past 5 years (Table 12).

Past experience with beaver-related problems was the single variable that explained the most variance in WAC. Age, education level, wildlife viewing, and study sample explained some of the variance in WAC, but were less powerful predictors of WAC (21% of variance explained,  $df = 4$ ,  $F = 48.77$ ,  $p = 0.00$ ).

All of these findings provide support for the assumption that direct personal experience with beaver problems reduces wildlife acceptance capacity, and that acceptance capacity also declines as the severity of problems increases.

### **Recognized Effects and Impacts**

We found that recognition of effects differed when respondents from the geographic strata were compared to those in the damage complaint stratum. Damage complainants were less likely to agree that beaver-created wetlands benefit other wildlife species or that people get enjoyment from seeing beaver activity (Table 13). Complainants were more likely to agree that beaver damage roads and bridges (Table 13). No differences were found across groups with regard to beliefs about contamination of drinking water associated with beaver flooding.

Impacts are effects that people believe are important enough to warrant management attention (Riley et al. 2002, 2003). Respondents who had suffered beaver damage were less likely than other respondents to agree that wildlife managers should manage for beneficial effects (i.e., for the wetlands habitat or wildlife viewing opportunities that beaver may create) (Table 14). Complainants were more likely than other respondents to agree that managers should attempt to reduce the cost of beaver damage to roads and bridges (Table 14). These findings suggest that experience with beaver-related problems influences perceptions about how beaver affect people and where beaver managers should focus their attention.

### **Attitudes Toward Beaver**

Respondents reported generally favorable attitudes toward beaver. In addition to agreeing that beaver activity creates benefits for people and wildlife (Table 14), most respondents in all 3 groups agreed with the statement, *beaver have a right to exist* (Table 15). The majority of respondents in the Mohawk and Taconic strata agreed with the statement, *beaver are a sign of a healthy environment* and *residents should learn to live with some conflicts with beaver*. Nearly half of respondents in the Mohawk and Taconic strata expressed protectionist attitudes, agreeing that *no beaver should be destroyed*. Even so, a desire for some form of beaver management is evidenced by the fact that about half of Mohawk and Taconic strata respondents agreed that *beaver populations should be controlled* (Table 15).

Respondents in the complainant stratum were different from respondents in the other two strata on several attitude measures (Table 15). Complainants were much more likely to agree that beaver are a nuisance and that having beaver near one's home is a burden. Complainants were twice as likely to agree that beaver populations should be controlled and fewer than 10% of complainants agreed with the statement *no beaver should be destroyed* (Table 15).

All the measures we used suggested an association between actual damage experience, perceptions of damage severity and frequency, and attitudes toward beaver. The pattern of more negative attitudes among respondents who have personally experienced damage is expressed in all three study strata (Table 16). Similar correlations appeared when we compared respondents who reported different levels of beaver damage severity. For all samples combined, respondents who reported high levels of beaver damage severity were more likely than other respondents to

have negative attitudes toward beaver (Table 17). The relationship between perceived severity of damage and attitudes toward beaver is consistent in all three study strata (Table 18). Similar patterns appear in comparisons of respondents by perceived trend in beaver damage. Respondents who believed that the extent of beaver damage in New York State had increased over the past five years were more likely than other respondents to hold negative attitudes toward beaver (Table 19). Again, the same patterns appear regardless of study area (Table 20). We also found a strong correlation between attitudes toward beaver and wildlife acceptance capacity (Table 21). For example, respondents who preferred a beaver population decrease were more likely than other respondents to agree with the statement, *beaver are a nuisance*, and to disagree with the statement, *beaver have a right to exist*. As with the comparisons just discussed, the association between WAC appears consistently across study areas (Table 22).

In summary, all of our findings are consistent with the assumption that experience with beaver-related problems exerts a strong influence on attitudes toward beaver. Our findings suggest that attitudes toward beaver become more negative if they experience beaver-related problems, if those problems are severe, and if respondents perceive that the incidence of beaver-related problems is increasing.

### **Norms about Beaver Management**

Our findings on norms about beaver management are reported in Tables 23 – 27 and Figures 2 – 4. The norms items in our survey instrument ask respondents whether they would find it acceptable to take various actions in response to scenarios on a continuum of incident extremity. Collectively, the results show a pattern of increasing acceptance of invasive beaver management actions as the consequences of beaver activity become more negative for people. We also found that people who had experienced beaver-related problems were more likely to find invasive management actions acceptable and were less likely to find a “taking no action” approach acceptable in any situation where people are negatively affected by beaver activity. Across groups, the proportion of respondents who found lethal actions acceptable generally increased as respondents were asked to consider interaction scenarios that involved negative economic or health effects on people.

#### **Acceptability of taking no action:**

For respondents in the Mohawk and Taconic study areas, taking no action was acceptable in the least-severe scenario (i.e., a beaver is seen in the yard). However, on average, respondents in those strata found taking no action unacceptable for the three remaining scenarios described (Table 23). Respondents in the Mohawk and Taconic strata did not differ from each other on these variables, but there was a significant statistical difference between the geographic strata and the damage complainant stratum (Table 23). Taking no action was unacceptable to complainants for all the scenarios presented, and the damage complainants exhibited stronger norms about taking no management action (Figure 2).

### **Acceptability of installing water control devices:**

All respondents found it acceptable to use drainage pipes to control water levels behind a beaver dam in any situation where beaver were having a negative effect on people (Table 24, Figure 3). There were no differences between groups on these variables.

### **Acceptability of installing water control devices:**

For most respondents in the Mohawk and Taconic study areas, lethal control of beaver was deemed acceptable only in the scenario involving possibility of disease transmission to humans. Respondents in the Mohawk and Taconic strata did not differ from each other on norms toward lethal control, but there were differences between the geographic strata and the damage complainant stratum (Table 25). Taking lethal management actions was acceptable to most respondents in the complainant stratum in any scenario that involved a negative effect of beaver on people (Figure 4).

### **Norms, perceptions and wildlife acceptance capacity:**

We also observed differences between respondents' norms associated with their perceptions about the statewide trend in beaver damage. Respondents who believed that beaver damage had increased in New York over the past five years were more likely than other respondents to find lethal actions acceptable to address situations which involved property damage or threats to human health (Table 26). They also were more likely than other respondents to find "taking no action" unacceptable when the scenario involved negative effects on people (Table 26).

Similar patterns can be found in Table 27, where we report comparisons of respondents with different levels of wildlife acceptance capacity. The results generally show that as acceptance capacity declines, respondents are more willing to accept lethal management actions, and they are less likely to believe that taking no management action is an acceptable response to beaver activity (Table 27).

In summary, all of our findings are consistent with the assumption that experience with beaver-related problems, perceptions about trends in beaver damage, and wildlife acceptance capacity exert a strong influence on norms toward beaver management actions. Acceptability of lethal beaver management actions is higher among people who have experienced beaver-related problems, have experienced what they believe are severe problems, perceive a trend toward increasing beaver-related problems in their state, and prefer a beaver population reduction.

## **DISCUSSION**

### **Similarities Between Study Sites**

When we designed this study, we selected study sites that we expected to differ with regard to traits such as urban/rural background and beaver damage experience. The Mohawk and Taconic study sites were indeed different with regard to the proportion of residents who had

experienced beaver damage. However, we found that respondents from the two study sites were similar in many ways. This may explain why we observed so few differences in attitudes and norms between the sites. Given the similarities we found, those who replicate this study in the future may choose to combine the two areas into one stratum for analysis.

### **Public Sentiment about Beaver and Beaver Management**

Respondents to our study expressed an appreciation for beaver and the benefits beaver activity provides to other wildlife and to the people of New York. Positive attitudes about beaver and appreciation of the benefits associated with beaver activity were even held by many respondents who had suffered economic or other damage as a result of beaver activity. Our data do not allow for generalization to all state residents. However, we can say that in the study areas, we found no evidence that beaver have achieved the status of “pest” in New York.

Though many of our respondents continue to value beaver as a resource, they also perceive a need to manage beaver populations and find it unacceptable for wildlife managers to take no action in situations where people are negatively impacted by beaver. Our respondents held a range of opinions on the appropriateness of lethal management of beaver in various situations. Respondents were in substantial agreement about use of lethal control when human health was at issue. However, they showed no consensus about the appropriateness of lethal control in response to damage to public or private property. Though these data do not represent all New York residents, it is reasonable to expect disagreement about the appropriateness of lethal control actions in any community faced with beaver management issues.

Since stakeholders disagree about the acceptability of various beaver management actions, the seeds for conflict about beaver management exist in every community. However, the likelihood for conflict between stakeholders is increased when a community begins experiencing an increase in beaver-related problems. Problems with beaver may increase the proportion of residents in an area who see a need for and support lethal management actions. However, a substantial portion of residents in the same area will never be exposed to beaver-related problems, and may continue to believe that lethal beaver management is unwarranted. The key to resolving conflicts in such situations may reside in reducing the frequency and severity of beaver-related problems, rather than changing the attitudes of stakeholders who are not exposed to problems that result from beaver activity. DEC attempts to achieve this end by setting beaver population objectives well below optimum biological capacity (Robert Gotie, DEC, personal communication) and by raising awareness of beaver, beaver management, and control of beaver damage.

### **Problem Experience and Wildlife Acceptance Capacity**

We found that beaver population preference (wildlife acceptance capacity) was highly correlated with beaver damage experience. In addition, beaver population preference was lower among those who perceived that beaver damage had increased. These findings provide some evidence to suggest that problem tolerance has been exceeded for many of those who have experienced problems. Our findings also are consistent with the hypothesis that tolerance of beaver decreases and attitudes toward beaver grow more negative as beaver-related conflicts

increase. Such findings point out the potential value of monitoring public attitudes, perceptions, and tolerance in a longitudinal study that includes information about changes in beaver populations and human-beaver conflicts. The findings also suggest that DEC can maintain tolerance for beaver in residential areas by continuing to set beaver trapping seasons that keep beaver populations at levels below biological optimum and by helping stakeholders to prevent or control damage associated with beaver activity.

The Northeast Furbearer Resources Technical Committee desired research on this issue because they held alternative hypotheses H<sub>3-4</sub> as working assumptions. Researchers have generally found that attitudes toward a given species (e.g., deer, geese, elk) become more negative as problems with that species increase. Tolerance of wildlife-related problems tends to decline as problem severity or problem frequency increases. Past HDRU research has supported the assumption that landowner acceptability of beaver decreases as perceived severity of beaver damage increases (Enck et al. 1996). So, data from this study are consistent with study hypotheses H<sub>3-4</sub>. Findings to the contrary would have been quite surprising and indicative of a paradigm shift with implications that go far beyond beaver management.

Our findings suggest that in areas where beaver populations cannot be managed within levels tolerable to people, managers are likely to witness decline in positive attitudes toward beaver, an increase in complaints about beaver activity, and some erosion of public support for conservation of wetlands. Managers already have empirical evidence of the relationship between beaver population levels and complaint loads (Runge 1999). For example, MassWildlife has noted an association between increased beaver occupancy rates and beaver-damage complaints in the three Massachusetts study sites selected for this research. Statewide, MassWildlife had to expand staff commitment from 383 staff days in 1997 to 529 staff days in 1999 to respond to the increased number of beaver-related problems in Massachusetts (Massachusetts Division of Wildlife press release, April 9, 1999).

Changes in complaint loads are relatively easy to document. By comparison, documenting shifts in attitudes and support for wetlands conservation is comparatively difficult, but important. Attitude change is not likely to follow a linear pattern, because people may “learn to live with” or tolerate low-level problems as they gain experience living in areas occupied by beaver. Data from periodic efforts to monitor changes in tolerance and other attitudes will help managers adjust their management programs as beaver occupancy rates and related beaver problems change over time.

### **Future Research**

The purpose of this job was to establish baseline data on attitudes and perceptions from which future comparisons will be derived. Data from this study will be synthesized with other efforts to characterize and monitor biological, social, and economic aspects of beaver management in the northeast. This study is based on the assumption that it will be repeated periodically in the future. A repeated-cross sectional design (Menard 1991) will be used. Sequential studies will use nonidentical, but comparable samples that allow for comparisons between or among measurement periods.

A fundamental assumption in the development of our research hypotheses was that negative interactions between people and beaver would increase as beaver populations increased (beaver populations are expected to increase as a function of beaver harvest restrictions, low pelt prices, or decline in the number of licensed trappers). Careful monitoring by the Massachusetts Division of Fisheries and Wildlife and NYSDEC, in combination with survey research, will allow us to test this assumption over time in both states.

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**Tables 1 - 27**

Table 1. Age, education, sex, residence, home ownership, and household income of respondents for three study samples in New York.

Study Sample	Age	Education <sup>1</sup>	Sex		Own residence	Rent residence	Household Income <sup>2</sup>
	$\bar{x}$	%	Male %	Female %	%	%	$\bar{x}$
Mohawk <sup>3</sup>	55.29 <sup>ab</sup>	37.4 college +	72.8	27.2	87.6 <sup>a</sup>	11.7 <sup>a</sup>	3.03 <sup>a</sup>
Taconic <sup>3</sup>	53.63 <sup>b</sup>	48.0 college +	69.7	30.3	86.4 <sup>a</sup>	12.2 <sup>a</sup>	3.10 <sup>a</sup>
Beaver Complaint <sup>3</sup>	57.87 <sup>ac</sup>	46.4 college +	75.1	24.9	96.8 <sup>b</sup>	1.4 <sup>b</sup>	3.41 <sup>b</sup>
F or $\chi^2$	8.05	$\chi^2=14.83$	$\chi^2=2.55$		8.92		8.10
<i>p</i>	0.00	0.06	0.28		0.00		0.00

1. Variable coded 1=grade school, 2=high school degree (or GED), 3=technical/vocational school, 4=college degree, 5=graduate degree/professional degree.
2. Variable coded 1=<\$15,000/year, 2=\$15,001-\$30,000/year, 3=\$30,001-\$60,000/year, 4=\$60,001-\$90,000/year, 5=\$90,001-\$120,000/year, 6=>\$120,000/year.
3. Any two means that do not have the same letter superscript are significantly different at  $p < 0.05$  (e.g., in the last column, the “b” superscript indicates that beaver complainants have a significantly different mean household income than the Mohawk or Taconic respondents). Degrees of freedom for all ANOVA are 3.

Table 2. Comparison of respondents' average number of years lived in current township and New York, and size of town where respondents grew up, for three study samples in New York.

	<b>Mohawk</b>	<b>Taconic</b>	<b>Beaver Complaint</b>	<b>F or <math>\chi^2</math></b>	<b><i>p</i></b>
Mean number of years lived in current township <sup>1</sup>	30.36 <sup>ab</sup>	27.11 <sup>b</sup>	31.63 <sup>ac</sup>	3.96	0.02
Mean number of years lived in New York <sup>1</sup>	51.04 <sup>a</sup>	43.38 <sup>b</sup>	51.00 <sup>a</sup>	17.36	0.00
Size of town grew up in <sup>2</sup>	20.9% small city	18.1% small city	17.0% small city	$\chi^2=59.53$ df=12	0.00

1. Any two means that do not have the same superscript are significantly different at  $p < 0.05$  (2 degrees of freedom for all ANOVA).

2. Variable coded 1=grew upon a farm, 2=grew up in country-side, but did not live on a farm, 3=small town (<5,000 people), 4=small city (5,000-50,000 people), 5=large city (over 50,000 but less than 300,000 people), 6=very large city (300,000 people or more), 7=I grew up in more than one area with different sized populations.

Table 3. Comparison of respondents' wildlife related activities for three study samples in New York.

<b>Wildlife Activity<sup>1,2</sup></b>	<b>Mohawk %</b>	<b>Taconic %</b>	<b>Beaver Complaint %</b>	<b><math>\chi^2</math></b>	<b><i>p</i></b>
Hunter	38.1	36.8	50.7	17.60	0.00
Angler	45.9	45.7	51.5	3.16	0.21
Fur trapper	2.4	6.4	9.5	12.20	0.00
Wildlife viewer <sup>3</sup>	54.3	64.8	57.0	7.23	0.03

1. Variables coded 0=no, 1=yes.

2. Degrees of freedom for all  $\chi^2$  are 2.

3. Variable defined as having taken 1 or more trips more than 1 mile from home specifically to watch wildlife (does not include trips to zoos or museums, or trips taken to hunt, fish, or trap).

Table 4. Comparison of respondents having experienced beaver damage, number of times experienced beaver damage, overall severity of beaver damage, and type of action taken in response to beaver damage for three study samples in New York.

	<b>Mohawk</b>	<b>Taconic</b>	<b>Beaver Complaint</b>	<b>F or <math>\chi^2</math></b>	<b><i>p</i></b>
Have had beaver problems <sup>1</sup>	10.7%	22.3%	94.7%	$\chi^2=613.26$ , df=2	0.00
Number of times have had beaver damage <sup>2</sup> ,	1.89	2.54	10.31	1.30	0.27
Severity of beaver problems <sup>2,3</sup>	2.44 <sup>a</sup>	2.60 <sup>a</sup>	3.76 <sup>b</sup>	31.59	0.00
	<b>Mohawk %</b>	<b>Taconic %</b>	<b>Beaver Complaint %</b>	<b><math>\chi^2</math></b>	<b><i>p</i></b>
Action taken in response to beaver damage <sup>4</sup>	(n=27)	(n=51)	(n=411)	$\chi^2=268.65$ , df=6	0.00
No action	51.9	60.8	0.7		
Non-lethal action	18.5	3.9	2.7		
Lethal action	18.5	23.5	38.7		
Lethal and non-lethal action	11.1	11.8	57.9		

1. Percent respondents who have experienced beaver problems (variable coded 0=no, 1=yes).

2. Cell entries are means. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.

3. Variable coded on scale from 1=light to 5=severe.

4. Variable coded 1=no action, 2= non-lethal action, 3= lethal action, 4= lethal and non-lethal action.

Table 5. Comparison of type of damage experienced by respondents for three study samples in New York.

<b>Type of beaver damage<sup>1,2</sup></b>	<b>Mohawk (n=32) %</b>	<b>Taconic (n=66) %</b>	<b>Beaver Complaint (n=417) %</b>	<b><math>\chi^2</math></b>	<b><i>p</i></b>
Flooded basement, well, septic system	9.4	6.1	9.6	0.86	0.65
Flooded private road or driveway	18.8	22.7	36.2	7.95	0.02
Damage to individual trees/woodlots	46.9	66.7	81.3	24.91	0.00
Damage to private pond/lake	34.4	22.7	43.9	11.12	0.00
Flooded crops, fields, drainage	31.3	15.2	26.1	4.36	0.11
Plugged culvert pipes	46.9	27.3	47.2	9.26	0.01

1. Variable coded 0=no, 1=yes.

2. Degrees of freedom for all  $\chi^2$  are 2.



Table 6. Mean wildlife acceptance capacity for three study samples in New York.

Study Sample	Wildlife Acceptance Capacity <sup>1</sup> (preferred change in beaver population)				Mean <sup>2</sup>	F	<i>p</i>
	No beaver	Fewer beaver	Current number of beaver	More beaver			
	%	%	%	%			
						116.81	0.00
Mohawk (n=272)	1.1	20.1	50.7	28.1	5.13 <sup>a</sup>		
Taconic (n=278)	1.1	24.0	44.4	30.6	5.08 <sup>a</sup>		
Beaver Complaint (n=425)	5.6	63.9	25.4	7.9	3.70 <sup>b</sup>		

1. Variable coded on a 9 point scale from 1=no beaver, 3=1/2 as many beaver, 5=current number of beaver, 7=50% more beaver, 9=at least twice as many beaver.

2. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for ANOVA are 2.

Table 7. Comparison of respondents' belief about trend in extent of beaver damage in New York for three study samples in New York.

<b>Perceived Extent of Beaver Damage<sup>1</sup></b>							
<b>Study Sample</b>	<b>Increased</b>	<b>Remained the same</b>	<b>Decreased</b>	<b>No Opinion</b>	<b>Mean<sup>2</sup></b>	<b>F</b>	<b><i>p</i></b>
	%	%	%	%			
						51.96	0.00
Mohawk (n=288)	21.2	24.0	4.2	50.7	2.56 <sup>a</sup>		
Taconic (n=289)	27.0	28.0	10.0	35.0	2.66 <sup>a</sup>		
Beaver Complaint (n=437)	63.6	15.6	5.5	15.3	1.88 <sup>b</sup>		

1. Variable coded on a 5-point scale from 1=greatly increased, 3=remained the same, 5=greatly decreased.

2. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for ANOVA are 2.

Table 8. Mean wildlife acceptance capacity by experience with beaver-related problems for three study samples in New York.

Study Sample	Mean Wildlife Acceptance Capacity <sup>1</sup>		<i>t</i>	<i>p</i>
	Did not Experience Beaver Damage	Experienced Beaver Damage		
Mohawk	5.10 (n=239)	5.33 (n=30)	-0.89	0.38
Taconic	5.34 (n=212)	4.15 (n=61)	5.80	0.00
All (3 Geographic areas and Beaver Complainants)	5.18 (n=477)	3.81 (n=488)	14.84	0.00

1. Variable coded on a 9 point scale from 1=no beaver, 3=1/2 as many beaver, 5=current number of beaver, 7=50% more beaver, 9=at least twice as many beaver.

Table 9. Mean wildlife acceptance capacity by severity of beaver damage experience for three study samples in New York.

Study Sample	Mean Wildlife Acceptance Capacity <sup>1,2</sup>			F	p
	Severity level (1=light – 3=severe) <sup>3</sup>				
	light 1	2	severe 3		
Mohawk (n=27)	6.07	5.33	4.38	2.55	0.10
Taconic (n=60)	4.63 <sup>a</sup>	4.27 <sup>ab</sup>	3.06 <sup>b</sup>	5.89	0.01
Beaver Complaint (n=409)	4.49 <sup>a</sup>	4.05 <sup>a</sup>	3.30 <sup>b</sup>	24.07	0.00
All (combined) (n=496)	4.76 <sup>a</sup>	4.10 <sup>b</sup>	3.32 <sup>c</sup>	42.32	0.00

1. Variable coded on a 9 point scale from 1=no beaver, 3=1/2 as many beaver, 5=current number of beaver, 7=50% more beaver, 9=at least twice as many beaver.

2. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.

3. Severity scale was measured on a 5 point scale 1=light to 5=severe and then collapsed where points 1+2=1, 3=2, 4+5=3.

Table 10. Mean wildlife acceptance capacity by type of beaver-related property damage for three study samples in New York.

Mean Wildlife Acceptance Capacity <sup>1</sup>												
Study Sample	Type of Beaver-Related Property Damage <sup>2</sup>											
	Flooded basement, well, septic		Flooded private road or driveway		Damage to individual trees/woodlots		Damage to private pond/lake		Flooded crops, fields, drainage		Plugged culvert pipes	
	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Mohawk	5.50	4.00	5.50	4.60	5.12	5.64	5.05	6.00	5.29	5.50	5.18	5.57
	<i>t</i> =1.31	<i>p</i> =0.20	<i>t</i> =0.97	<i>p</i> =0.34	<i>t</i> =-0.76	<i>p</i> =0.46	<i>t</i> =-1.32	<i>p</i> =0.20	<i>t</i> =-0.29	<i>p</i> =0.78	<i>t</i> =-0.57	<i>p</i> =0.58
Taconic	4.24	3.25	4.27	3.86	4.05	4.24	4.26	3.85	4.25	3.80	4.28	3.88
	<i>t</i> =1.13	<i>p</i> =0.26	<i>t</i> =0.79	<i>p</i> =0.43	<i>t</i> =-0.44	<i>p</i> =0.66	<i>t</i> =0.78	<i>p</i> =0.44	<i>t</i> =0.76	<i>p</i> =0.45	<i>t</i> =0.83	<i>p</i> =0.41
Beaver Complaint	3.67	3.43	3.80	3.39	3.91	3.59	3.69	3.60	3.80	3.25	3.77	3.53
	<i>t</i> =1.0	<i>p</i> =0.32	<i>t</i> =2.81	<i>p</i> =0.01	<i>t</i> =1.73	<i>p</i> =0.09	<i>t</i> =0.67	<i>p</i> =0.50	<i>t</i> =3.48	<i>p</i> =0.00	<i>t</i> =1.72	<i>p</i> =0.09
All (combined)	3.86	3.45	4.00	3.47	4.12	3.74	3.88	3.73	3.94	3.47	3.94	3.68
	<i>t</i> =1.67	<i>p</i> =0.10	<i>t</i> =3.65	<i>p</i> =0.00	<i>t</i> =2.31	<i>p</i> =0.02	<i>t</i> =1.07	<i>p</i> =0.29	<i>t</i> =3.02	<i>p</i> =0.00	<i>t</i> =1.90	<i>p</i> =0.06

1. Variable coded on a 9 point scale from 1=no beaver, 3=1/2 as many beaver, 5=current number of beaver, 7=50% more beaver, 9=at least twice as many beaver.

2. Variable coded 0=no, 1=yes.

Table 11. Mean wildlife acceptance capacity by type of action respondents took in response to beaver damage for three study samples in New York.

<b>Mean Wildlife Acceptance Capacity<sup>1,2</sup></b>						
<b>Study Sample</b>	<b>No Action (n)</b>	<b>Non-lethal Action (n)</b>	<b>Lethal Action (n)</b>	<b>Lethal &amp; Non- lethal Action (n)</b>	<b>F</b>	<b>p</b>
Mohawk (n=26)	5.64 (14)	5.20 (5)	5.50 (4)	4.33 (3)	0.34	0.80
Taconic (n=48)	4.64 <sup>a</sup> (28)	5.00 <sup>ab</sup> (2)	3.58 <sup>ab</sup> (12)	2.50 <sup>b</sup> (6)	4.30	0.01
Beaver Complaint (n=394)	4.00 (3)	4.64 (11)	3.74 (154)	3.52 (26)	2.71	0.05
All (combined) (n=471)	4.87 <sup>a</sup> (46)	4.74 <sup>ab</sup> (19)	3.77 <sup>bd</sup> (171)	3.51 <sup>cd</sup> (235)	13.95	0.00

1. Variable coded on a 9 point scale from 1=no beaver, 3=1/2 as many beaver, 5=current number of beaver, 7=50% more beaver, 9=at least twice as many beaver.

2. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 3.

Table 12. Mean wildlife acceptance capacity by beliefs about extent of beaver damage for three study samples in New York.

Study Sample	Mean Wildlife Acceptance Capacity <sup>1,2</sup>			F	p
	Perceived Extent of Beaver Damage <sup>3</sup>				
	1 (increased)	2 (same)	3 (decreased)		
Mohawk (n=140)	4.83 <sup>a</sup>	5.49 <sup>b</sup>	5.50 <sup>ab</sup>	5.08	0.01
Taconic (n=184)	4.40 <sup>a</sup>	5.29 <sup>b</sup>	5.52 <sup>b</sup>	8.62	0.00
Beaver Complaint (n=366)	3.30 <sup>a</sup>	4.46 <sup>b</sup>	4.42 <sup>b</sup>	26.18	0.00

1. Variable coded on a 9 point scale from 1=no beaver, 3=1/2 as many beaver, 5=current number of beaver, 7=50% more beaver, 9=at least twice as many beaver.

2. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.

3. Beliefs about extent of damage was measured on a 5 point scale from 1=greatly increased, 3=remained the same, 5=greatly decreased. Variable collapsed here from 1=increased, 3=remained the same, 3=decreased.

Table 13. Recognition of beaver-related effects for three study samples in New York.

<b>Attitude statement<sup>1</sup></b>	<b>Response</b>	<b>Mohawk (%) (n=289-291)</b>	<b>Taconic (%) (n=288-291)</b>	<b>Beaver Complaint (%) (n=434-436)</b>	<b>F<sup>2</sup></b>	<b>p</b>
Beaver created wetlands Benefit other species of Wildlife	Agree	81.8	83.7	69.5	<b>11.08</b>	<b>0.00</b>
	Disagree	9.2	10.0	15.4		
	Neutral	2.4	4.5	12.6		
	No opinion	6.5	1.7	2.5		
<b>mean</b>		<b>2.04<sup>a</sup></b>	<b>1.88<sup>a</sup></b>	<b>2.30<sup>b</sup></b>		
Beaver damage to roads and bridges is a problem	Agree	41.2	47.8	77.4	<b>67.22</b>	<b>0.00</b>
	Disagree	25.4	23.7	11.5		
	Neutral	19.2	21.0	7.8		
	No opinion	14.1	7.6	3.2		
<b>mean</b>		<b>3.17<sup>a</sup></b>	<b>2.90<sup>a</sup></b>	<b>2.06<sup>b</sup></b>		
People get enjoyment from seeing beaver Activity	Agree	77.7	78.8	61.9	<b>16.56</b>	<b>0.00</b>
	Disagree	13.4	11.0	17.2		
	Neutral	4.5	7.2	16.5		
	No opinion	4.5	3.1	4.4		
<b>mean</b>		<b>2.17<sup>a</sup></b>	<b>2.08<sup>a</sup></b>	<b>2.56<sup>b</sup></b>		
Drinking water contaminated by beaver flooding exposes people to diseases	Agree	48.1	51.7	56.6	<b>1.67</b>	<b>0.19</b>
	Disagree	22.9	21.4	18.2		
	Neutral	13.7	13.4	8.7		
	No opinion	15.4	13.4	16.6		
<b>mean</b>		<b>2.97</b>	<b>2.90</b>	<b>2.74</b>		

1. Variables coded on a 5-point scale from “strongly agree” (1) to “neutral” (3) to “strongly disagree” (5). Reported percents of Agree=strongly agree + agree and Disagree=strongly disagree + disagree.

2. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.



Table 14. Recognition of beaver-related impacts for three study samples in New York.

<b>Attitude statement<sup>1</sup></b>	<b>Response</b>	<b>Mohawk (%) (n=286-288)</b>	<b>Taconic (%) (n=286-288)</b>	<b>Beaver Complaint (%) (n=432-438)</b>	<b>F<sup>2</sup></b>	<b>p</b>
<i>Wildlife managers should attempt to . . .</i>						
Maintain beaver created wetlands as a means to benefit wildlife other than beaver	Agree	72.8	69.3	47.6	<b>23.26</b>	<b>0.00</b>
	Disagree	13.4	15.0	20.8		
	Neutral	8.3	13.6	27.7		
	No opinion	5.5	2.1	3.9		
	<b>mean</b>	<b>2.33<sup>a</sup></b>	<b>2.66<sup>a</sup></b>	<b>2.49<sup>b</sup></b>		
Reduce the cost of beaver damage to roads and bridges	Agree	61.5	64.0	79.1	<b>25.07</b>	<b>0.00</b>
	Disagree	21.9	22.5	13.3		
	Neutral	5.9	5.9	2.8		
	No opinion	10.8	7.6	4.8		
	<b>mean</b>	<b>2.66<sup>a</sup></b>	<b>2.51<sup>a</sup></b>	<b>2.02<sup>b</sup></b>		
Create opportunities for the public to see Beaver activity	Agree	63.8	58.3	39.8	<b>27.12</b>	<b>0.00</b>
	Disagree	21.4	22.9	25.9		
	Neutral	9.7	16.7	28.0		
	No opinion	5.2	2.1	6.3		
	<b>mean</b>	<b>2.49<sup>a</sup></b>	<b>2.51<sup>a</sup></b>	<b>3.10<sup>b</sup></b>		
Ensure that beaver flooding does not contaminate drinking Water	Agree	87.2	85.4	91.6	<b>5.52</b>	<b>0.00</b>
	Disagree	4.9	7.6	3.2		
	Neutral	3.1	3.8	1.6		
	No opinion	4.9	3.1	3.7		
	<b>mean</b>	<b>1.90<sup>a</sup></b>	<b>1.85<sup>ab</sup></b>	<b>1.64<sup>b</sup></b>		

1. Variables coded on a 5-point scale from “strongly agree” (1) to “neutral” (3) to “strongly disagree” (5). Reported percents of Agree=strongly agree + agree and Disagree=strongly disagree + disagree.

2. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.

Table 15. Comparison of respondent attitudes toward beaver for three study samples in New York.

Attitude statement <sup>1</sup>	Response	Mohawk	Taconic	Beaver	F <sup>2</sup>	p
		(%) (n=249-282)	(%) (n=262-286)	Complaint (%) (n=406-438)		
Beaver are a nuisance	Agree	15.4	25.4	75.5	<b>221.07</b>	<b>0.00</b>
	Disagree	53.3	47.3	8.8		
	<b>Mean<sup>2</sup></b>	<b>3.44<sup>a</sup></b>	<b>3.28<sup>a</sup></b>	<b>1.93<sup>b</sup></b>		
Beaver have a right to exist	Agree	89.7	86.4	74.9	<b>22.16</b>	<b>0.00</b>
	Disagree	2.5	4.1	11.9		
	<b>Mean<sup>2</sup></b>	<b>1.80<sup>a</sup></b>	<b>1.77<sup>a</sup></b>	<b>2.17<sup>b</sup></b>		
Beaver are a sign of a healthy environment	Agree	74.4	72.4	48.8	<b>34.08</b>	<b>0.00</b>
	Disagree	4.3	7.4	20.2		
	<b>Mean<sup>2</sup></b>	<b>2.09<sup>a</sup></b>	<b>2.09<sup>a</sup></b>	<b>2.63<sup>b</sup></b>		
Beaver populations should be left alone	Agree	38.8	41.1	7.7	<b>143.67</b>	<b>0.00</b>
	Disagree	24.6	32.0	76.5		
	<b>Mean<sup>2</sup></b>	<b>2.82<sup>a</sup></b>	<b>2.80<sup>a</sup></b>	<b>3.99<sup>b</sup></b>		
Beaver populations should be controlled	Agree	48.1	46.8	87.0	<b>129.24</b>	<b>0.00</b>
	Disagree	20.1	25.4	5.0		
	<b>Mean<sup>2</sup></b>	<b>2.66<sup>a</sup></b>	<b>2.76<sup>a</sup></b>	<b>1.69<sup>b</sup></b>		
No beaver should be destroyed	Agree	48.5	48.8	8.9	<b>161.22</b>	<b>0.00</b>
	Disagree	26.9	33.9	79.9		
	<b>Mean<sup>2</sup></b>	<b>2.70<sup>a</sup></b>	<b>2.73<sup>a</sup></b>	<b>4.05<sup>b</sup></b>		

Table 15 continued. Comparison of respondent attitudes toward beaver for three study samples in New York.

Attitude statement <sup>1</sup>	Response	Mohawk	Taconic	Beaver	F <sup>2</sup>	p
		(%) (n=249-282)	(%) (n=262-286)	Complaint (%) (n=406-438)		
People don't want a wetland near their home because it could become a haven for beaver	Agree	24.6	22.9	47.3	<b>33.92</b>	<b>0.00</b>
	Disagree	39.5	45.4	25.7		
	<b>Mean<sup>2</sup></b>	<b>3.17<sup>a</sup></b>	<b>3.26<sup>a</sup></b>	<b>2.63<sup>b</sup></b>		
Residents should learn to live with some conflicts with beaver	Agree	55.0	61.4	39.1	<b>43.29</b>	<b>0.00</b>
	Disagree	16.8	17.7	41.4		
	<b>Mean<sup>2</sup></b>	<b>2.55<sup>a</sup></b>	<b>2.43<sup>a</sup></b>	<b>3.15<sup>b</sup></b>		
The presence of beaver makes it a burden to have a wetland near your home	Agree	18.1	21.8	56.8	<b>71.25</b>	<b>0.00</b>
	Disagree	46.6	50.0	23.8		
	<b>Mean<sup>2</sup></b>	<b>3.33<sup>a</sup></b>	<b>3.36<sup>a</sup></b>	<b>2.49<sup>b</sup></b>		

1. Variables coded on a 5-point scale from "strongly agree" (1) to "neutral" (3) to "strongly disagree" (5). Reported percents of Agree=strongly agree + agree and Disagree=strongly disagree + disagree.

2. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.

Table 16. Comparison of respondent attitudes toward beaver by whether or not respondents experienced beaver damage for three study samples in New York.

Attitude Statement <sup>2</sup> <i>'In the area where I live...'</i>	Experienced a Beaver-Related Problem <sup>1</sup>							
	Overall Sample		Mohawk		Taconic		Beaver Complaint	
	No	Yes	No	Yes	No	Yes	No	Yes
Beaver are a nuisance	3.49 <i>t=22.33 p=0.00</i>	2.01	3.51 <i>t=3.80 p=0.00</i>	2.82	3.59 <i>t=7.58 p=0.00</i>	2.40	2.52 <i>t=2.94 p=0.00</i>	1.89
Beaver have a right to exist	1.75 <i>t=-7.10 p=0.00</i>	2.16	1.79 <i>t=-0.43 p=0.67</i>	1.86	1.70 <i>t=-2.11 p=0.04</i>	1.97	1.65 <i>t=-2.52 p=0.01</i>	2.21
Beaver are a sign of a healthy environment	2.04 <i>t=-8.58 p=0.00</i>	2.60	2.09 <i>t=0.02 p=0.98</i>	2.08	1.98 <i>t=-3.47 p=0.00</i>	2.44	2.18 <i>t=-1.94 p=0.05</i>	2.66
Beaver populations should be left alone	2.73 <i>t=-17.46 p=0.00</i>	3.93	2.75 <i>t=-3.48 p=0.00</i>	3.48	2.60 <i>t=-5.26 p=0.00</i>	3.49	3.61 <i>t=-1.98 p=0.05</i>	4.03
Beaver populations should be controlled	2.76 <i>t=15.23 p=0.00</i>	1.78	2.73 <i>t=2.91 p=0.00</i>	2.14	2.90 <i>T=3.30 p=0.00</i>	2.37	1.95 <i>t=1.52 p=0.13</i>	1.67
No beaver should be destroyed	2.62 <i>t=-18.42 p=0.00</i>	3.97	2.59 <i>t=-4.59 p=0.00</i>	3.67	2.54 <i>t=-4.67 p=0.00</i>	3.39	3.65 <i>t=-1.99 p=0.05</i>	4.08

Table 16 continued. Comparison of respondent attitudes toward beaver by whether or not respondents experienced beaver damage for three study samples in New York.

Attitude Statement <sup>2</sup> <i>'In the area where I live...'</i>	Experienced a Beaver-Related Problem <sup>1</sup>							
	Overall Sample		Mohawk		Taconic		Beaver Complaint	
	No	Yes	No	Yes	No	Yes	No	Yes
People don't want a wetland near their home because it could become a haven for beaver	3.25 <i>t=7.73 p=0.00</i>	2.70	3.15 <i>t=-1.08 p=0.28</i>	3.38	3.42 <i>t=3.76 p=0.00</i>	2.85	2.86 <i>t=0.96 p=0.34</i>	2.62
Residents should learn to live with some conflicts with beaver	2.47 <i>t=-8.55 p=0.00</i>	3.09	2.56 <i>t=-0.09 p=0.93</i>	2.58	2.36 <i>t=-1.82 p=0.07</i>	2.63	2.61 <i>t=-2.21 p=0.03</i>	3.19
The presence of beaver makes it a burden to have a wetland near your home	3.43 <i>t=12.53 p=0.00</i>	2.53	3.29 <i>t=-1.61 p=0.11</i>	3.60	3.59 <i>t=5.73 p=0.00</i>	2.74	3.29 <i>t=3.24 p=0.00</i>	2.43

1. Respondents who did not experience beaver damage (No) and respondents who did experience beaver damage (Yes).

2. Variables coded on a 5-point scale from "strongly agree" (1) to "neutral" (3) to "strongly disagree" (5).

Table 17. Comparison of respondent attitudes toward beaver by severity of respondents' experience with beaver damage for all study samples combined in New York.

Attitude <sup>1</sup>	n	Severity Level of Beaver Damage <sup>2</sup>			F <sup>3</sup>	p
		1 (light)	2	3 (severe)		
Beaver are a nuisance	695	2.86 <sup>a</sup>	2.14 <sup>b</sup>	1.61 <sup>c</sup>	65.46	0.00
Beaver have a right to exist	686	1.72 <sup>a</sup>	1.99 <sup>a</sup>	2.43 <sup>b</sup>	21.42	0.00
Beaver are sign of a healthy environment	665	2.05 <sup>a</sup>	2.36 <sup>a</sup>	2.93 <sup>b</sup>	27.32	0.00
Beaver populations should be left alone	679	3.31 <sup>a</sup>	3.71 <sup>b</sup>	4.29 <sup>c</sup>	44.29	0.00
Beaver populations should be controlled	698	2.31 <sup>a</sup>	1.97 <sup>b</sup>	1.46 <sup>c</sup>	41.11	0.00
No beaver should be destroyed	693	3.52 <sup>a</sup>	3.72 <sup>a</sup>	4.26 <sup>b</sup>	23.56	0.00
People don't want a wetland near their home because it could become a haven for beaver	670	3.27 <sup>a</sup>	2.98 <sup>a</sup>	2.33 <sup>b</sup>	29.85	0.00
Residents should learn to live with some conflicts with beaver	688	2.50 <sup>a</sup>	2.85 <sup>a</sup>	3.43 <sup>b</sup>	26.01	0.00
The presence of beaver makes it a burden to have a wetland near your home	677	3.32 <sup>a</sup>	2.75 <sup>b</sup>	2.12 <sup>c</sup>	45.87	0.00

1. Variables coded on a 5-point scale from “strongly agree” (1) to “neutral” (3) to “strongly disagree” (5).

2. Severity scale was measured on a 5 point scale 1=light – 5=severe and then collapsed where points 1+2=1, 3=2, 4+5=3.

3. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.

Table 18. Comparison of respondent attitudes toward beaver by severity of respondents' experience with beaver for three study samples in New York.

Attitude <sup>4</sup>	Severity Level of Beaver Damage (1=light – 3=severe) <sup>1,2,3</sup>								
	Mohawk			Taconic			Beaver Complaint		
	1 (light)	2	3 (severe)	1 (light)	2	3 (severe)	1 (light)	2	3 (severe)
Beaver are a nuisance	3.57 <sup>a</sup>	3.00 <sup>a</sup>	1.88 <sup>b</sup>	2.67 <sup>a</sup>	2.54 <sup>a</sup>	1.47 <sup>b</sup>	2.78 <sup>a</sup>	2.07 <sup>b</sup>	1.61 <sup>c</sup>
	F = 9.89		<i>p</i> = 0.00	F = 6.89		<i>p</i> = 0.00	F = 42.89		<i>p</i> = 0.00
Beaver have a right to exist	1.43 <sup>a</sup>	1.67 <sup>ab</sup>	2.63 <sup>b</sup>	1.74 <sup>a</sup>	1.85 <sup>ab</sup>	2.65 <sup>b</sup>	1.77 <sup>a</sup>	2.01 <sup>a</sup>	2.41 <sup>b</sup>
	F = 4.52		<i>p</i> = 0.02	F = 4.36		<i>p</i> = 0.02	F = 12.42		<i>p</i> = 0.00
Beaver are sign of a healthy environment	1.79	2.00	2.80	2.08 <sup>a</sup>	2.25 <sup>ab</sup>	3.06 <sup>b</sup>	2.10 <sup>a</sup>	2.37 <sup>a</sup>	2.93 <sup>b</sup>
	F = 3.23		<i>p</i> = 0.06	F = 3.90		<i>p</i> = 0.03	F = 17.63		<i>p</i> = 0.00
Beaver populations should be left alone	3.29	3.33	4.33	3.27	3.31	4.06	3.33 <sup>a</sup>	3.78 <sup>b</sup>	4.31 <sup>c</sup>
	F = 3.23		<i>p</i> = 0.06	F = 2.53		<i>p</i> = 0.09	F = 33.35		<i>p</i> = 0.00
Beaver populations should be controlled	2.33 <sup>a</sup>	1.67 <sup>a</sup>	1.43 <sup>b</sup>	2.52 <sup>a</sup>	2.77 <sup>a</sup>	1.53 <sup>b</sup>	2.22 <sup>a</sup>	1.88 <sup>b</sup>	1.45 <sup>c</sup>
	F = 1.83		<i>p</i> = 0.18	F = 6.18		<i>p</i> = 0.00	F = 27.48		<i>p</i> = 0.00

Table 18 continued. Comparison of respondent attitudes toward beaver by severity of respondents' experience with beaver for three study samples in New York.

Attitude <sup>4</sup>	Severity Level of Beaver Damage (1=light – 3=severe) <sup>1,2,3</sup>								
	Mohawk			Taconic			Beaver Complaint		
	1 (light)	2	3 (severe)	1 (light)	2	3 (severe)	1 (light)	2	3 (severe)
No beaver should be destroyed	3.43 F = 1.29	3.00 p = 0.30	4.29	3.15 F = 2.31	3.08 p = 0.11	3.89	3.69 <sup>a</sup> F = 14.33	3.81 <sup>a</sup> p = 0.00	4.29 <sup>b</sup>
People don't want a wetland near their home because it could become a haven for beaver	3.77 F = 2.77	3.00 p = 0.09	2.63	2.96 <sup>a</sup> F = 9.35	3.64 <sup>a</sup> p = 0.00	1.95 <sup>b</sup>	3.29 <sup>a</sup> F = 20.70	2.87 <sup>a</sup> p = 0.00	2.34 <sup>b</sup>
Residents should learn to live with some conflicts with beaver	2.36 F = 1.23	2.67 p = 0.31	3.14	2.27 <sup>a</sup> F = 3.97	2.62 <sup>ab</sup> p = 0.03	3.28 <sup>b</sup>	2.63 <sup>a</sup> F = 15.83	2.88 <sup>a</sup> p = 0.00	3.45 <sup>b</sup>
The presence of beaver makes it a burden to have a wetland near your home	4.31 <sup>a</sup> F = 11.05	3.33 <sup>ab</sup> p = 0.00	2.71 <sup>b</sup>	3.00 <sup>a</sup> F = 6.72	3.08 <sup>a</sup> p = 0.00	1.84 <sup>b</sup>	3.25 <sup>a</sup> F = 29.47	2.70 <sup>b</sup> p = 0.00	2.12 <sup>c</sup>

1. Severity scale was measured on a 5 point scale 1=light – 5=severe and then collapsed where points 1+2=1, 3=2, 4+5=3.
2. Cell entries are means.
3. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.
4. Variable coded on a 5-point scale from “strongly agree” (1) to “neutral” (3) to “strongly disagree” (5).



Table 19. Comparison of respondent attitudes toward beaver by perceived extent of beaver damage for all study samples combined in New York.

Attitude <sup>1</sup>	Perceived Extent of Beaver Damage <sup>2,3</sup>			F	p	
	n	Increased	Remained the Same			Decreased
Beaver are a nuisance	939	1.95 <sup>a</sup>	3.25 <sup>b</sup>	3.11 <sup>b</sup>	109.59	0.00
Beaver have a right to exist	958	2.23 <sup>a</sup>	1.75 <sup>b</sup>	1.63 <sup>b</sup>	24.03	0.00
Beaver are sign of a healthy environment	906	2.64 <sup>a</sup>	2.09 <sup>b</sup>	2.02 <sup>b</sup>	23.64	0.00
Beaver populations should be left alone	933	4.02 <sup>a</sup>	2.85 <sup>b</sup>	2.86 <sup>b</sup>	96.33	0.00
Beaver populations should be controlled	948	1.67 <sup>a</sup>	2.69 <sup>b</sup>	2.76 <sup>b</sup>	95.96	0.00
No beaver should be destroyed	947	3.98 <sup>a</sup>	2.95 <sup>b</sup>	2.97 <sup>b</sup>	62.37	0.00
People don't want a wetland near their home because it could become a haven for beaver	985	2.60 <sup>a</sup>	3.31 <sup>b</sup>	3.38 <sup>b</sup>	35.71	0.00
Residents should learn to live with some conflicts with beaver	941	3.19 <sup>a</sup>	2.43 <sup>b</sup>	2.44 <sup>b</sup>	35.96	0.00
The presence of beaver makes it a burden to have a wetland near your home	908	2.43 <sup>a</sup>	3.39 <sup>b</sup>	3.32 <sup>b</sup>	57.84	0.00

1. Variables coded on a 5-point scale from “strongly agree” (1) to “neutral” (3) to “strongly disagree” (5).

2. Beliefs about extent of damage was measured on a 5 point scale from 1=greatly increased, 3=remained the same, 5=greatly decreased. Variable collapsed here from 1=increased, 2=remained the same, 3=decreased.

3. Cell entries are means. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.

Table 20. Comparison of respondent attitudes toward beaver by perceived extent of beaver damage for three study samples in New York.

Attitude <sup>3</sup>	Perceived Extent of Beaver Damage <sup>1,2</sup>								
	Mohawk			Taconic			Beaver Complaint		
	1 (Increased)	2 (Same)	3 (Decreased)	1 (Increased)	2 (Same)	3 (Decreased)	1 (Increased)	2 (Same)	3 (Decreased)
Beaver are a nuisance	2.90 <sup>a</sup>	3.66 <sup>b</sup>	3.08 <sup>ab</sup>	2.41 <sup>a</sup>	3.44 <sup>b</sup>	3.64 <sup>b</sup>	1.63 <sup>a</sup>	2.52 <sup>b</sup>	2.50 <sup>b</sup>
	F = 11.36		<i>p</i> = 0.00	F = 19.74		<i>p</i> = 0.00	F = 31.57		<i>p</i> = 0.00
Beaver have a right to exist	1.88	1.70	1.83	2.00 <sup>a</sup>	1.77 <sup>ab</sup>	1.43 <sup>b</sup>	2.36 <sup>a</sup>	1.80 <sup>b</sup>	1.75 <sup>b</sup>
	F = 1.13		<i>p</i> = 0.33	F = 4.49		<i>p</i> = 0.01	F = 10.30		<i>p</i> = 0.00
Beaver are sign of a healthy environment	2.04	2.06	1.92	2.49 <sup>a</sup>	1.95 <sup>b</sup>	1.86 <sup>b</sup>	2.82 <sup>a</sup>	2.30 <sup>b</sup>	2.26 <sup>ab</sup>
	F = 0.15		<i>p</i> = 0.86	F = 7.21		<i>p</i> = 0.00	F = 7.13		<i>p</i> = 0.00
Beaver populations should be left alone	3.39 <sup>a</sup>	2.65 <sup>b</sup>	2.90 <sup>ab</sup>	3.66 <sup>a</sup>	2.59 <sup>b</sup>	2.14 <sup>b</sup>	4.25 <sup>a</sup>	3.41 <sup>b</sup>	3.67 <sup>b</sup>
	F = 8.52		<i>p</i> = 0.00	F = 26.73		<i>p</i> = 0.00	F = 22.59		<i>p</i> = 0.00
Beaver populations should be controlled	2.10 <sup>a</sup>	2.87 <sup>b</sup>	2.92 <sup>b</sup>	2.05 <sup>a</sup>	3.00 <sup>b</sup>	3.28 <sup>b</sup>	1.47 <sup>a</sup>	2.12 <sup>b</sup>	2.08 <sup>b</sup>
	F = 11.51		<i>p</i> = 0.00	F = 20.09		<i>p</i> = 0.00	F = 22.35		<i>p</i> = 0.00
No beaver should be destroyed	3.29 <sup>a</sup>	2.70 <sup>b</sup>	2.33 <sup>b</sup>	3.49 <sup>a</sup>	2.64 <sup>b</sup>	2.45 <sup>b</sup>	4.26 <sup>a</sup>	3.60 <sup>b</sup>	3.92 <sup>ab</sup>
	F = 5.29		<i>p</i> = 0.01	F = 12.00		<i>p</i> = 0.00	F = 12.72		<i>p</i> = 0.00

Table 20 continued. Comparison of respondent attitudes toward beaver by perceived extent of beaver damage for three study samples in New York.

Attitude <sup>3</sup>	Perceived Extent of Beaver Damage <sup>1,2</sup>								
	Mohawk			Taconic			Beaver Complaint		
	1 (Increased)	2 (Same)	3 (Decreased)	1 (Increased)	2 (Same)	3 (Decreased)	1 (Increased)	2 (Same)	3 (Decreased)
People don't want a wetland near their home because it could become a haven for beaver	2.95	3.30	3.50	2.93 <sup>a</sup>	3.53 <sup>b</sup>	3.50 <sup>ab</sup>	2.42 <sup>a</sup>	3.05 <sup>b</sup>	3.23 <sup>b</sup>
	F = 2.75		p = 0.07	F = 6.77		p = 0.00	F = 11.26		p = 0.00
Residents should learn to live with some conflicts with beaver	2.62	2.39	2.55	2.78 <sup>a</sup>	2.28 <sup>b</sup>	2.18 <sup>b</sup>	3.41 <sup>a</sup>	2.65 <sup>b</sup>	2.74 <sup>b</sup>
	F = 0.97		p = 0.38	F = 5.43		p = 0.01	F = 12.66		p = 0.00
The presence of beaver makes it a burden to have a wetland near your home	3.02 <sup>a</sup>	3.47 <sup>b</sup>	3.55 <sup>ab</sup>	2.76 <sup>a</sup>	3.62 <sup>b</sup>	3.54 <sup>b</sup>	2.21 <sup>a</sup>	3.03 <sup>b</sup>	2.91 <sup>b</sup>
	F = 4.09		p = 0.02	F = 13.00		p = 0.00	F = 15.98		p = 0.00

1. Beliefs about extent of damage was measured on a 5 point scale from 1=greatly increased, 3=remained the same, 5=greatly decreased. Variable collapsed here from 1=increased, 2=remained the same, 3=decreased.

2. Cell entries are means. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.

3. Variables coded on a 5-point scale from "strongly agree" (1) to "neutral" (3) to "strongly disagree" (5).

Table 21. Comparison of respondent attitudes toward beaver by wildlife acceptance capacity for all study samples combined in New York.

Attitude <sup>1</sup>	Wildlife Acceptance Capacity <sup>2,3</sup>			F	p
	Fewer Beaver	Current Number of Beaver	More Beaver		
Beaver are a nuisance	1.77 <sup>a</sup>	3.24 <sup>b</sup>	3.78 <sup>c</sup>	362.26	0.00
Beaver have a right to exist	2.39 <sup>a</sup>	1.74 <sup>b</sup>	1.46 <sup>c</sup>	91.43	0.00
Beaver are sign of a healthy environment	2.87 <sup>a</sup>	2.08 <sup>b</sup>	1.68 <sup>c</sup>	122.50	0.00
Beaver populations should be left alone	4.11 <sup>a</sup>	2.92 <sup>b</sup>	2.42 <sup>c</sup>	255.70	0.00
Beaver populations should be controlled	1.61 <sup>a</sup>	2.58 <sup>b</sup>	3.06 <sup>c</sup>	178.43	0.00
No beaver should be destroyed	4.03 <sup>a</sup>	2.94 <sup>b</sup>	2.49 <sup>c</sup>	138.79	0.00
People don't want a wetland near their home because it could become a haven for beaver	2.42 <sup>a</sup>	3.30 <sup>b</sup>	3.51 <sup>b</sup>	101.25	0.00
Residents should learn to live with some conflicts with beaver	3.35 <sup>a</sup>	2.46 <sup>b</sup>	2.19 <sup>c</sup>	106.56	0.00
The presence of beaver makes it a burden to have a wetland near your home	2.27 <sup>a</sup>	3.34 <sup>b</sup>	3.71 <sup>c</sup>	167.58	0.00

1. Variables coded on a 5-point scale from “strongly agree” (1) to “neutral” (3) to “strongly disagree” (5).

2. Variable coded on a 9 point scale from 1=no beaver, 3=1/2 as many beaver, 5=current number of beaver, 7=50% more beaver, 9=at least twice as many beaver. Variable collapsed here from 1=fewer beaver, 2=current number of beaver, 3=more beaver.

3. Cell entries are means. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.

Table 22. Comparison of respondent attitudes toward beaver by wildlife acceptance capacity for three study samples in New York.

Attitude <sup>3</sup>	Wildlife Acceptance Capacity <sup>1,2</sup>								
	Mohawk			Taconic			Beaver Complaint		
	1 (fewer)	2 (current)	3 (more)	1 (fewer)	2 (current)	3 (more)	1 (fewer)	2 (current)	3 (more)
Beaver are a nuisance	2.77 <sup>a</sup> F = 24.95	3.46 <sup>b</sup> p = 0.00	3.86 <sup>c</sup>	2.13 <sup>a</sup> F = 74.58	3.44 <sup>b</sup> p = 0.00	4.05 <sup>c</sup>	1.52 <sup>a</sup> F = 104.33	2.74 <sup>b</sup> p = 0.00	2.91 <sup>b</sup>
Beaver have a right to exist	2.13 <sup>a</sup> F = 11.49	1.81 <sup>b</sup> p = 0.00	1.52 <sup>c</sup>	2.34 <sup>a</sup> F = 26.50	1.69 <sup>b</sup> p = 0.00	1.39 <sup>c</sup>	2.45 <sup>a</sup> F = 29.46	1.71 <sup>b</sup> p = 0.00	1.52 <sup>b</sup>
Beaver are sign of a healthy environment	2.35 <sup>a</sup> F = 11.63	2.21 <sup>a</sup> p = 0.00	1.74 <sup>b</sup>	2.84 <sup>a</sup> F = 39.33	1.98 <sup>b</sup> p = 0.00	1.62 <sup>c</sup>	2.97 <sup>a</sup> F = 43.29	2.02 <sup>b</sup> p = 0.00	1.73 <sup>b</sup>
Beaver populations should be left alone	3.31 <sup>a</sup> F = 10.09	2.79 <sup>b</sup> p = 0.00	2.50 <sup>b</sup>	3.82 <sup>a</sup> F = 54.16	2.73 <sup>b</sup> p = 0.00	2.04 <sup>c</sup>	4.33 <sup>a</sup> F = 66.21	3.28 <sup>b</sup> p = 0.00	3.22 <sup>b</sup>
Beaver populations should be controlled	2.18 <sup>a</sup> F = 10.21	2.70 <sup>b</sup> p = 0.00	2.99 <sup>c</sup>	1.90 <sup>a</sup> F = 44.28	2.79 <sup>b</sup> p = 0.00	3.45 <sup>c</sup>	1.44 <sup>a</sup> F = 44.51	2.20 <sup>b</sup> p = 0.00	2.26 <sup>b</sup>
No beaver should be destroyed	3.04 <sup>a</sup> F = 3.90	2.73 <sup>ab</sup> p = 0.02	2.44 <sup>b</sup>	3.60 <sup>a</sup> F = 29.35	2.60 <sup>b</sup> p = 0.00	2.14 <sup>c</sup>	4.30 <sup>a</sup> F = 26.68	3.58 <sup>b</sup> p = 0.00	3.53 <sup>b</sup>

Table 22 continued. Comparison of respondent attitudes toward beaver by wildlife acceptance capacity for three study samples in New York.

Attitude <sup>3</sup>	Wildlife Acceptance Capacity <sup>1 2</sup>								
	Mohawk			Taconic			Beaver Complaint		
	1 (fewer)	2 (current)	3 (more)	1 (fewer)	2 (current)	3 (more)	1 (fewer)	2 (current)	3 (more)
People don't want a wetland near their home because it could become a haven for beaver	2.57 <sup>a</sup>	3.15 <sup>b</sup>	3.56 <sup>c</sup>	2.51 <sup>a</sup>	3.42 <sup>b</sup>	3.68 <sup>b</sup>	2.35 <sup>a</sup>	3.36 <sup>b</sup>	2.97 <sup>b</sup>
	F = 18.01    p = 0.00			F = 29.54    p = 0.00			F = 32.04    p = 0.00		
Residents should learn to live with some conflicts with beaver	2.86 <sup>a</sup>	2.61 <sup>a</sup>	2.24 <sup>b</sup>	3.07 <sup>a</sup>	2.34 <sup>b</sup>	1.98 <sup>c</sup>	3.50 <sup>a</sup>	2.39 <sup>b</sup>	2.64 <sup>b</sup>
	F = 7.44    p = 0.00			F = 23.86    p = 0.00			F = 41.30    p = 0.00		
The presence of beaver makes it a burden to have a wetland near your home	2.71 <sup>a</sup>	3.26 <sup>b</sup>	3.82 <sup>c</sup>	2.47 <sup>a</sup>	3.49 <sup>b</sup>	3.95 <sup>c</sup>	2.15 <sup>a</sup>	3.28 <sup>b</sup>	2.88 <sup>b</sup>
	F = 25.74    p = 0.00			F = 46.57    p = 0.00			F = 42.91    p = 0.00		

1. Variable coded on a 9 point scale from 1=no beaver, 3=1/2 as many beaver, 5=current number of beaver, 7=50% more beaver, 9=at least twice as many beaver. Variable collapsed here from 1=fewer beaver, 2=current number of beaver, 3=more beaver.

2. Cell entries are means. Any two means that do not have the same superscript are significantly different at p < 0.05. Degrees of freedom for all ANOVA are 2.

3. Variables coded on a 5-point scale from “strongly agree” (1) to “neutral” (3) to “strongly disagree” (5).

Table 23. Acceptability of taking no immediate action in response to beaver activity for three study samples in New York.

<i>Taking no immediate action would be justified when a beaver:</i>	<b>Acceptability of Taking No Action<sup>1</sup></b>				
	<b>Mohawk<sup>2</sup></b>	<b>Taconic<sup>2</sup></b>	<b>Beaver Complaint<sup>2</sup></b>	<b>F</b>	<b><i>p</i></b>
Is seen in my yard	2.33 <sup>a</sup>	2.30 <sup>a</sup>	3.09 <sup>b</sup>	45.47	0.00
Floods public road	3.81 <sup>a</sup>	3.84 <sup>a</sup>	4.34 <sup>b</sup>	33.32	0.00
Damages my private property	3.72 <sup>a</sup>	3.74 <sup>a</sup>	4.30 <sup>b</sup>	33.91	0.00
Carries disease harmful to humans	4.02 <sup>a</sup>	4.11 <sup>ab</sup>	4.31 <sup>b</sup>	5.90	0.00

1. Variable coded on a 5-point scale from “strongly agree” (1) to “neutral” (3) to “strongly disagree” (5).

2. Cell entries are means. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.

Table 24. Acceptability of installing drainage pipes to control water levels behind a beaver dam in response to beaver activity for three study samples in New York.

<i>Installing drainage pipes to control water levels behind a beaver dam would be justified when a beaver:</i>	<b>Acceptability of Installing Water Devices<sup>1</sup></b>				
	<b>Mohawk<sup>2</sup></b>	<b>Taconic<sup>2</sup></b>	<b>Beaver Complaint<sup>2</sup></b>	<b>F</b>	<b><i>p</i></b>
Is seen in my yard	3.39	3.43	3.21	2.88	0.06
Floods public road	2.03	2.09	1.98	0.90	0.41
Damages my private property	2.31	2.43	2.25	1.59	0.21
Carries disease harmful to humans	2.23	2.33	2.37	0.83	0.44

1. Variable coded on a 5-point scale from “strongly agree” (1) to “neutral” (3) to “strongly disagree” (5).

2. Cell entries are means. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.



Table 25. Acceptability of lethal control in response to beaver activity for three study samples in New York.

<i>Lethal control would be justified when a beaver:</i>	Acceptability of Lethal Control <sup>1</sup>			F	<i>p</i>
	Mohawk <sup>2</sup>	Taconic <sup>2</sup>	Beaver Complaint <sup>2</sup>		
Is seen in my yard	3.95 <sup>a</sup>	3.87 <sup>a</sup>	3.13 <sup>b</sup>	45.18	0.00
Floods public road	3.31 <sup>a</sup>	3.37 <sup>a</sup>	2.14 <sup>b</sup>	112.88	0.00
Damages my private property	3.13 <sup>a</sup>	3.24 <sup>a</sup>	1.93 <sup>b</sup>	129.54	0.00
Carries disease harmful to humans	2.06 <sup>a</sup>	2.13 <sup>a</sup>	1.53 <sup>b</sup>	36.86	0.00

1. Variable coded on a 5-point scale from “strongly agree” (1) to “neutral” (3) to “strongly disagree” (5).

2. Cell entries are means. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.

Table 26. Comparison of the acceptability of taking no immediate action, installing water flow devices, and lethal control in response to beaver activity by perceived extent of beaver damage for all study samples combined in New York.

Management action would be justified when a beaver:	Perceived Extent of Beaver Damage <sup>1,2</sup>								
	Taking No Immediate Action <sup>3</sup>			Installing Water Flow Devices <sup>3</sup>			Lethal Control <sup>3</sup>		
	1 (increased)	2 (same)	3 (decreased)	1 (increased)	2 (same)	3 (decreased)	1 (increased)	2 (same)	3 (decreased)
Is seen in my yard	3.03 <sup>a</sup>	2.29 <sup>b</sup>	2.75 <sup>a</sup>	3.22	3.48	3.21	3.09 <sup>a</sup>	3.87 <sup>b</sup>	3.84 <sup>b</sup>
	F = 22.24		p = 0.00	F = 2.93		p = 0.05	F = 26.87		p = 0.00
Floods public road	4.35 <sup>a</sup>	3.91 <sup>b</sup>	3.75 <sup>b</sup>	1.98	2.08	2.05	2.18 <sup>a</sup>	3.07 <sup>b</sup>	3.31 <sup>b</sup>
	F = 19.46		p = 0.00	F = 0.51		p = 0.60	F = 45.93		p = 0.00
Damages my private property	4.33 <sup>a</sup>	3.76 <sup>b</sup>	3.59 <sup>b</sup>	2.24	2.39	2.42	1.99 <sup>a</sup>	2.91 <sup>b</sup>	3.13 <sup>b</sup>
	F = 27.49		p = 0.00	F = 1.12		p = 0.33	F = 50.92		p = 0.00
Carries disease harmful to humans	4.33 <sup>a</sup>	4.07 <sup>b</sup>	3.71 <sup>b</sup>	2.32	2.34	2.61	1.55 <sup>a</sup>	2.10 <sup>b</sup>	2.03 <sup>b</sup>
	F = 9.55		p = 0.00	F = 1.05		p = 0.35	F = 23.37		p = 0.00

1. Beliefs about extent of damage was measured on a 5 point scale from 1=greatly increased, 3=remained the same, 5=greatly decreased. Variable collapsed here from 1=increased, 2=remained the same, 3=decreased.

2. Cell entries are means. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.

3. Variables coded on a 5-point scale from “strongly agree” (1) to “neutral” (3) to “strongly disagree” (5).

Table 27. Comparison of the acceptability of taking no immediate action, installing water flow devices, and lethal control in response to beaver activity by wildlife acceptance capacity for all study samples combined in New York.

Management action would be justified when a beaver:	Wildlife Acceptance Capacity <sup>1 2</sup>								
	Taking No Immediate Action <sup>3</sup>			Installing Water Flow Devices <sup>3</sup>			Lethal Control <sup>3</sup>		
	1 (fewer)	2 (current)	3 (more)	1 (fewer)	2 (current)	3 (more)	1 (fewer)	2 (current)	3 (more)
Is seen in my yard	3.34 <sup>a</sup>	2.28 <sup>b</sup>	1.98 <sup>c</sup>	3.11 <sup>a</sup>	3.44 <sup>b</sup>	3.57 <sup>b</sup>	2.82 <sup>a</sup>	3.97 <sup>b</sup>	4.31 <sup>c</sup>
	F = 112.23		<i>p</i> = 0.00	F = 10.82		<i>p</i> = 0.00	F = 135.99		<i>p</i> = 0.00
Floods public road	4.36 <sup>a</sup>	3.94 <sup>b</sup>	3.69 <sup>c</sup>	2.07	1.98	2.01	2.01 <sup>a</sup>	3.19 <sup>b</sup>	3.76 <sup>c</sup>
	F = 35.62		<i>p</i> = 0.00	F = 0.65		<i>p</i> = 0.52	F = 172.58		<i>p</i> = 0.00
Damages my private property	4.37 <sup>a</sup>	3.87 <sup>b</sup>	3.44 <sup>c</sup>	2.27	2.27	2.49	1.85 <sup>a</sup>	2.98 <sup>b</sup>	3.60 <sup>c</sup>
	F = 54.50		<i>p</i> = 0.00	F = 2.24		<i>p</i> = 0.11	F = 171.54		<i>p</i> = 0.00
Carries disease harmful to humans	4.35 <sup>a</sup>	4.14 <sup>b</sup>	3.92 <sup>b</sup>	2.35	2.26	2.44	1.50 <sup>a</sup>	1.95 <sup>b</sup>	2.47 <sup>c</sup>
	F = 9.42		<i>p</i> = 0.00	F = 0.94		<i>p</i> = 0.39	F = 61.59		<i>p</i> = 0.00

1. Variable coded on a 9 point scale from 1=no beaver, 3=1/2 as many beaver, 5=current number of beaver, 7=50% more beaver, 9=at least twice as many beaver.

Variable collapsed here from 1=fewer beaver, 2=current number of beaver, 3=more beaver.

2. Cell entries are means. Any two means that do not have the same superscript are significantly different at  $p < 0.05$ . Degrees of freedom for all ANOVA are 2.

3. Variables coded on a 5-point scale from “strongly agree” (1) to “neutral” (3) to “strongly disagree” (5).

**Figures 2 – 4**

Figure 2. Acceptability of Taking No Action Toward Beaver Across Study Samples in New York.

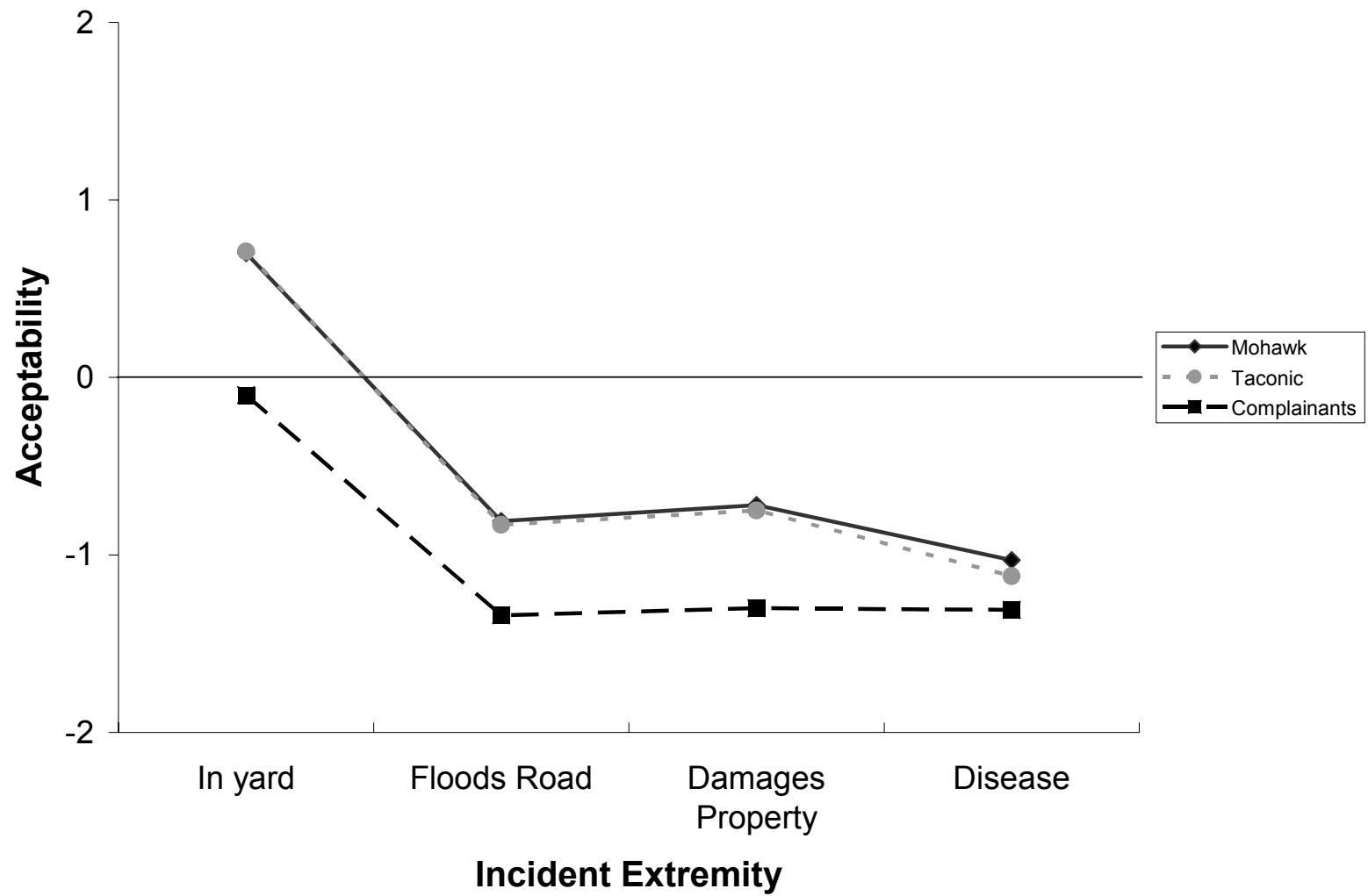


Figure 3. Acceptability of Non-Lethal Control (Water Flow Devices) for Beaver Across Study Samples in New York.

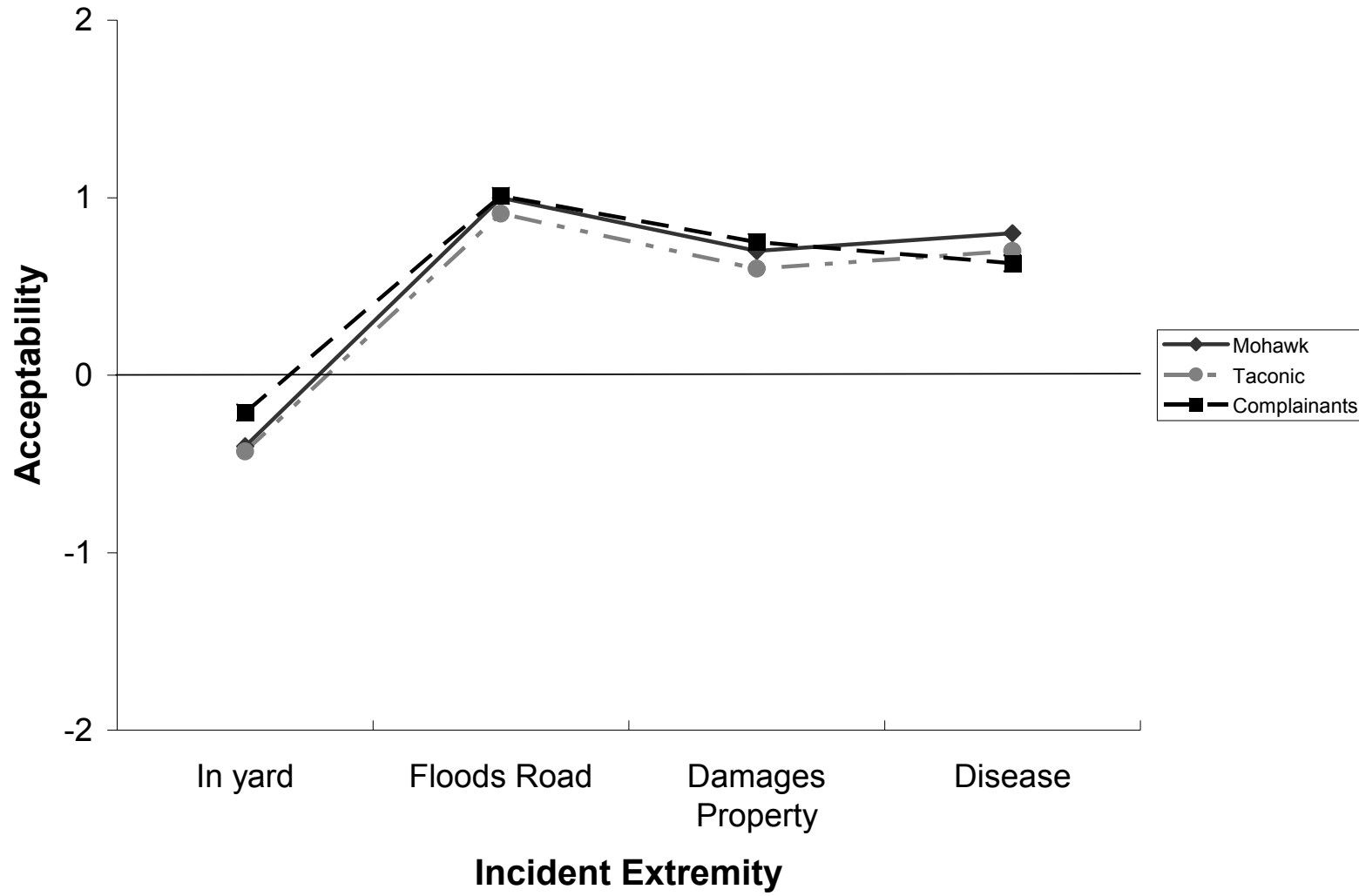
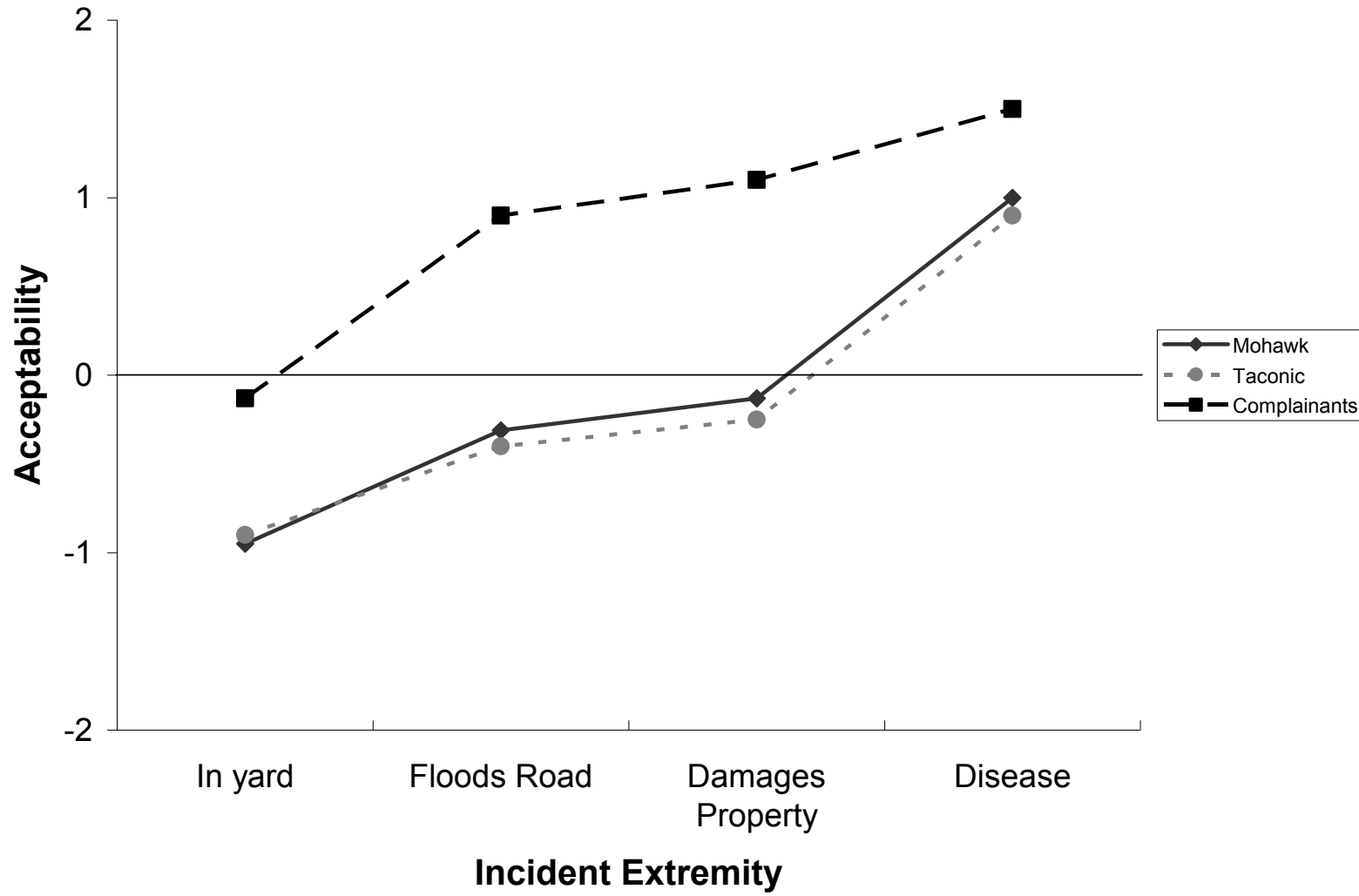


Figure 4. Acceptability of Lethal Control of Beaver Across Study Samples in New York.



## **Appendix A: Beaver management questionnaire**



## YOUR EXPERIENCE WITH BEAVER

This section is designed to help us better understand your personal experiences related to beaver problems.

1. Before receiving this questionnaire, did you know that there are beaver living in New York State? *(Please circle one number)*

- 1 Yes**  
**2 No**

2. Have you ever experienced a problem at or around your home that resulted from beaver or beaver activity? *(Please circle one number)*


- 1 Yes** → → → IF YES, CONTINUE TO QUESTION 3  
**2 No** → → → IF NO, PLEASE GO TO QUESTION 7

3. During the last two years how **many times** have you experienced damage from beaver?

\_\_\_\_\_ **Number of times**

4. Overall, how would you describe the severity of the problems you have experienced with beaver during the past 2 years? *(Please circle one number)*

**Light**      **1**      **2**      **3**      **4**      **5**      **Severe**



5. What types of beaver-related property damage have you personally experienced? *(Please circle all that apply)*

- 1 Flooding of a basement, well, or septic system**  
**2 Flooding of a private road or driveway**  
**3 Damage to individual trees or woodlots**  
**4 Private lake/pond damaged or caused to overflow**  
**5 Flooding that damaged crops, crop fields, or a crop field drainage system**  
**6 Plugged culvert pipes**  
**7 Other (please describe \_\_\_\_\_ )**

6. What actions have you taken to control property damage or nuisance problems caused by beaver? *(Please circle all that apply)*
- 1 I have taken no actions to control the problems
  - 2 I have contacted DEC for information about beaver control methods
  - 3 I have contacted DEC for a permit to remove beaver or beaver dams
  - 4 I have tried to remove the beaver myself (e.g., by trapping)
  - 5 I have hired a private problem animal control agent to remove the beaver
  - 6 I have asked a licensed fur-trapper to remove the beaver
  - 7 I tried to control water levels by installing water control devices in dams
  - 8 Other (please describe \_\_\_\_\_ )

**YOUR ATTITUDES AND BELIEFS ABOUT BEAVER**

In this section we would like to understand your views and feelings specifically about beaver regardless of whether or not you have seen, interacted with, or experienced any damage from beaver yourself.

7. Please indicate the degree to which you agree or disagree with the following statements about beaver in New York. *(Please circle one number for each statement)*

<b>In New York State:</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>No Opinion</b>
Beaver created wetlands benefit other species of wildlife	1	2	3	4	5	6
Beaver damage to roads and bridges is a problem	1	2	3	4	5	6
People get enjoyment from seeing beaver activity	1	2	3	4	5	6
Drinking water contaminated by beaver flooding exposes people to diseases	1	2	3	4	5	6

8. To what extent do you agree or disagree that wildlife managers should attempt to achieve the following regarding beaver? *(Please circle one number for each statement)*

	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>No Opinion</b>
Maintain beaver created wetlands as a means to benefit wildlife other than beaver	1	2	3	4	5	6
Reduce the cost of beaver damage to roads and bridges	1	2	3	4	5	6
Create opportunities for the public to see beaver activity	1	2	3	4	5	6
Ensure that beaver flooding does not contaminate drinking water	1	2	3	4	5	6

9. The following statements reflect different beliefs people have about beaver. Please indicate the extent to which you agree or disagree with each. *(Please circle one number for each statement)*

<b>“In the area where I live ...”</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>No Opinion</b>
Beaver are common	1	2	3	4	5	6
There are too many beaver	1	2	3	4	5	6
Beaver are a nuisance	1	2	3	4	5	6
Beaver have a right to exist	1	2	3	4	5	6
Beaver are a sign of a healthy environment	1	2	3	4	5	6
Beaver populations should be left alone	1	2	3	4	5	6
Beaver populations should be controlled	1	2	3	4	5	6

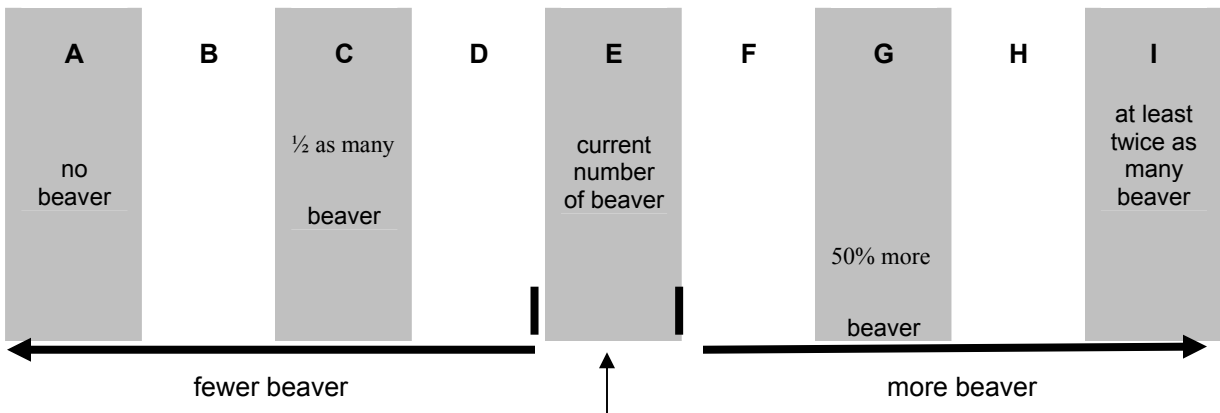
“In the area where I live ...”	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No Opinion
No beaver should be destroyed	1	2	3	4	5	6
People don't want a wetland near their home because it could become a haven for beaver	1	2	3	4	5	6
Residents should learn to live with some conflicts with beaver	1	2	3	4	5	6
The presence of beaver makes it a burden to have a wetland near your home	1	2	3	4	5	6

10. Based upon your present knowledge about and/or experience with beaver damage in New York, in your opinion, what best describes the **extent of beaver damage in the state over the past 5 years**? (Please circle one number)

Over the past 5 years, beaver damage has:

Greatly Increased	Slightly Increased	Remained the Same	Slightly Decreased	Greatly Decreased	No Opinion
1	2	3	4	5	6

11. In the figure below, the letter **E** represents the current number of beaver in New York State. Choose the letter below which best reflects **your preference** for the future population of beaver in New York. (Please circle one letter)



Consider the following situations that involve beaver activity. Then, indicate which actions you would find appropriate in those situations.

12. To what extent do you agree or disagree that **taking no immediate action** would be justified for **each** situation described below? *(Please circle one number for each situation)*

Taking no immediate action would be justified when:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No Opinion
A beaver is seen in my yard	1	2	3	4	5	6
A beaver floods a public road	1	2	3	4	5	6
A beaver damages my private property (trees, well, etc.)	1	2	3	4	5	6
A beaver carries a disease that is harmful to humans	1	2	3	4	5	6

13. To what extent do you agree or disagree that **installing drainage pipes to control water levels behind a beaver dam** would be justified for **each** situation described below? *(Please circle one number for each situation)*

Installing drainage pipes to control water levels behind a beaver dam would be justified when:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No Opinion
A beaver is seen in my yard	1	2	3	4	5	6
A beaver floods a public road	1	2	3	4	5	6
A beaver damages my private property (trees, well, etc.)	1	2	3	4	5	6
A beaver carries a disease that is harmful to humans	1	2	3	4	5	6

14. To what extent do you agree or disagree that **lethal control of beaver** would be justified for **each** situation described below? (*Please circle one number for each situation*)

Lethal control of beaver would be justified when:	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No Opinion
A beaver is seen in my yard	1	2	3	4	5	6
A beaver floods a public road	1	2	3	4	5	6
A beaver damages my private property (trees, well, etc.)	1	2	3	4	5	6
A beaver carries a disease that is harmful to humans	1	2	3	4	5	6

**YOUR BELIEFS ABOUT WILDLIFE**

15. This section explores your beliefs and **attitudes about wildlife in general**. The following statements reflect different beliefs people have about wildlife. Please indicate the extent to which you agree or disagree with each. (*Please circle one number for each statement*)

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	No Opinion
Having wildlife around my home is important to me	1	2	3	4	5	6
I notice birds and wildlife around me every day	1	2	3	4	5	6
It is important for humans to manage wild animal populations	1	2	3	4	5	6
If wildlife populations are not in danger of extinction, we should have the opportunity to use them to add to the quality of human life	1	2	3	4	5	6
Whether or not I get to see wildlife as much as I like, it is important to know they exist in New York	1	2	3	4	5	6

	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neutral</b>	<b>Disagree</b>	<b>Strongly Disagree</b>	<b>No Opinion</b>
An important part of my local community is the wildlife I see there from time to time	1	2	3	4	5	6
Participation in regulated hunting makes people insensitive to suffering	1	2	3	4	5	6
Although wildlife may have certain rights, most human needs are more important than the rights of wildlife	1	2	3	4	5	6
It is important to know that there are healthy populations of wildlife in New York	1	2	3	4	5	6
The rights of wildlife are more important than the human use of wildlife	1	2	3	4	5	6
It is acceptable for human use to cause the loss of some individual wild animals as long as populations are not jeopardized	1	2	3	4	5	6
Participation in regulated hunting is cruel and inhumane to animals	1	2	3	4	5	6
The rights of people and the rights of wildlife are equally important	1	2	3	4	5	6
Participation in regulated hunting helps people appreciate wildlife and natural processes	1	2	3	4	5	6
Humans should manage wild animal populations for the benefit of all people	1	2	3	4	5	6
We should be sure future generations of New York residents will have an abundance of wildlife	1	2	3	4	5	6
Participation in regulated hunting allows people to feel more self reliant	1	2	3	4	5	6

## BACKGROUND INFORMATION

Please remember that all your responses are confidential

16. How many years have you lived in your current town, and in New York?

\_\_\_\_\_ years living in current township

\_\_\_\_\_ years living in New York

17. Are you?

1 Male

2 Female

18. What is your age?

\_\_\_\_ Years old

19. Are you a:

	Yes	No
Hunter	1	2
Angler	1	2
Fur trapper	1	2

20. In the past year, have you taken 1 or more trips more than 1 mile from home specifically to watch wildlife (do not include trips to zoos or museums, or trips taken to hunt, fish, or trap)

Yes

No

21. Do you own or rent/lease the residence that you currently live in? (*Please circle one number*)

1 Own

2 Rent/lease

3 Other: \_\_\_\_\_



22. What is the highest level of formal education you have completed? (Please circle one number)

- 1 Grade school
- 2 High school degree (or GED)
- 3 Technical/vocational school
- 4 College degree
- 5 Graduate degree/professional degree

23. In what size town did you primarily grow up? (*Please circle one number*)

- 1 Grew up on a farm
- 2 Grew up in country-side, but did not live on a farm
- 3 Small town (less than 5,000 people)
- 4 Small city (5,000 to 50,000 people)
- 5 Large city (over 50,000 but less than 300,000 people)
- 6 Very large city (300,000 or more people)
- 7 I grew up in more than one area with different sized populations

24. Which of the following best describes your ethnic background? (*Please circle one number*)

- 1 White
- 2 Hispanic
- 3 Black (African-American)
- 4 Bi-racial (mixed ethnic background)
- 5 Asian or Pacific Islander
- 6 Native American (American Indian)
- 7 Other

25. Which category best describes your total 2001 household income before taxes and other deductions? (*Please circle one number*)

- 1 **Less than \$15,000/year**
- 2 **\$15,001-\$30,000**
- 3 **\$30,001-\$60,000/year**
- 4 **\$60,001-\$90,000/year**
- 5 **\$90,001-\$120,000/year**
- 6 **More than \$120,000/year**

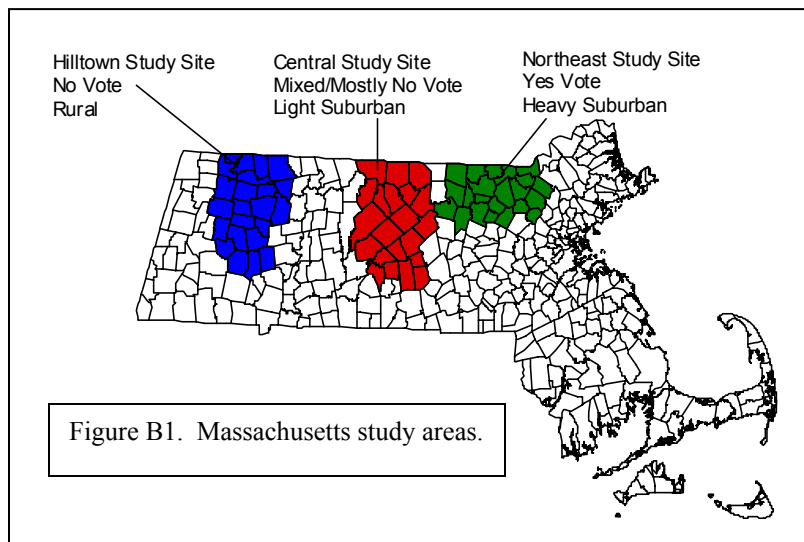
## Appendix B: Survey Implementation in Massachusetts

The Massachusetts survey was implemented in April-May, 2002. The study included a subsample of private individuals who had submitted a residential nuisance beaver complaint to MassWildlife. Members of this subgroup were selected from agency records of complaints filed in 1999 and 2000 (the most recent years for which these data were available). Individuals who made complaints about nonresidential problems (e.g., damage to public roads, businesses) were not included in this study.

The Massachusetts study included subgroups of people from three geographic regions (Figure B1). The study sites were located in western, central, and northeastern portions of the state. Two (northeast and central) of the three sites were chosen because they are part of ongoing beaver density surveys started in 1994 (Langlois 1999) that provide information on beaver abundance and distribution (in 2002 beaver density was 0.75 colonies/km<sup>2</sup> in the northeast and 0.83 colonies/km<sup>2</sup> in the central study site). The western site was added so that the study would: (1) provide data from all regions of the state, (2) provide information across a rural – suburban gradient, and (3) depict differences in the results of the 1996 ballot initiative vote restricting trapping in Massachusetts.

Staff in Massachusetts contacted a sample of 5,563 people in 4 subgroups or strata. They sampled 1600 in each of the three geographic strata and sampled 763 people who had contacted MassWildlife with a beaver damage complaint in 1999 or 2000. Of the 5,563 surveys sent out across all sample strata, 311 surveys were non-deliverable or non-useable surveys. With 2,486 useable surveys this represents a 47.3% overall response rate. After adjusting for non-deliverable/non-useable questionnaires the useable response rate for the Northeast, Central, and Hilltown study sites combined was 43.5% (4800 sent out, 222 non-deliverable, 1990 useable). The adjusted response rate for the statewide sample of beaver damage complainants was 73.6% (763 sent out, 89 non-deliverable, 496 useable).

A random sample of 300 non-respondents was selected for the non-response follow-up telephone interviews. Interviews were completed over a 3-week period (June 4 – June 25, 2002).



Each respondent was called up to 4 times before being rejected from the sample. We obtained 100 completed non-response interviews (95 people were called but never reached, 37 people were unreachable at the telephone number provided, 29 people had no time or were not interested in participating, 27 people refused to be interviewed, and 12 people were deceased or could not respond due to medical reasons).

## **Appendix C: Nonrespondent follow-up interview**

Good (Morning, Afternoon, Evening):

My name is \_\_\_\_\_ and I work for Cornell University. I'm calling you about a survey we sent your household recently asking for your opinions about beaver management in New York State (\* the survey had a white cover with a drawing of a beaver on the front).

We mailed that survey to the adult in your household with the most recent birthday. Would that be you or someone else? [IF NOT, ASK FOR NAME AND BEST TIME TO CONTACT THIS PERSON.]

[WHEN APPROPRIATE PERSON TO INTERVIEW HAS BEEN LOCATED]:

We realize that you may have been too busy to fill out the survey we mailed you, but we want to include the opinions of everyone, even people who may not be interested in beaver. Would you be willing to answer just a few key questions from the survey now? It will only take about 5 minutes. [IF NO, FIND OUT WHEN IT WOULD BE CONVENIENT TO CALL AGAIN.]

IF YES, PRESS ENTER TO BEGIN ...

1. Have you ever experienced a problem at or around your home that resulted from beaver or beaver activity?

1 Yes → → → IF YES, CONTINUE TO QUESTION 2

2 No → → → IF NO, PLEASE GO TO QUESTION 4

2. Overall, how would you describe the severity of the problems you have experienced with beaver during the past 2 years? (*using a scale of 1 to 5, with 1 being "light" and 5 being "severe" ?*)

1	2	3	4	5
Light				severe

3. Which of the following kinds of beaver-related property damage have you experienced?

Yes No

- |     |   |   |  |
|-----|---|---|--|
| 3a. | 1 | 2 | Flooding of a basement, well, or septic system.                            |
| 3b. | 1 | 2 | Flooding of a private road or driveway.                                    |
| 3c. | 1 | 2 | Damage to individual trees or woodlots.                                    |
| 3d. | 1 | 2 | Private lake/pond damaged or caused to overflow.                           |
| 3e. | 1 | 2 | Flooding that damaged crops, crop fields, or a crop field drainage system. |
| 3f. | 1 | 2 | Plugged culvert pipes.   |

Now I'd like your response to several statements. After each statement I'll ask if you agree, disagree, have a neutral opinion, or have no opinion at all.

4. Here is the first statement: "Beaver are a sign of a healthy environment."

Do you . . .

- 1 Agree
- 2 Disagree
- 3 Are you neutral
- 4 Or do you have no opinion?

5. "Beaver populations should be controlled."

Do you . . .

- 1 Agree
- 2 Disagree
- 3 Are you neutral
- 4 Or do you have no opinion?

6. "The rights of people and the rights of wildlife are equally important."

Would you . . .

- 1 Agree
- 2 Disagree
- 3 Are you neutral
- 4 Or do you have no opinion?

7. In the future, would you prefer that New York State had fewer beaver, about the same number of beaver, or more beaver?

- 1 Fewer
- 2 About the same number
- 3 More beaver

8. Now I'd like you to tell me your opinions about lethal control of beaver in two different situations. Please tell me if you agree or disagree with the following statements. Here is the first one: "Lethal control of beaver would be justified when a beaver floods a public road."

Would you . . .

- 1 Agree
- 2 Disagree
- 3 Are you neutral
- 4 Or do you have no opinion?

9. "Lethal control of beaver would be justified when a beaver damages my private property (trees, well, etc.)."

Would you . . .

- 1 Agree
- 2 Disagree
- 3 Are you neutral
- 4 Or do you have no opinion?

10. How many years have you lived in New York?

\_\_\_\_\_ years living in New York

11. What is your age?

\_\_\_\_\_ Years old

12. Are you a:

- 1 Hunter
- 2 Angler

13. And my last question is, What is your highest level of formal education?

- 1 Grade school
- 2 High school degree (or GED)
- 3 Technical/vocational school
- 4 College degree
- 5 Graduate degree/professional degree

Thank you for taking the time to talk with me today! [END INTERVIEW, HANG UP PHONE.]

14. Enter sex of respondent.

1. Missing
2. Female
3. Male

**Appendix D: Results of respondent - nonrespondent comparisons**

Table D.1. Age, education, gender, years lived in the state, experience with beaver-related problems, and participation in fishing and hunting among non-respondents and respondents by study sample.

Study Sample	Age $\bar{x}$	Education %	Gender		Number of years lived in New York %	Have experienced beaver problems $\bar{x}$	Participate in fishing, hunting, or both %
			Male%	Female%			
Mohawk	55.29	37.4% college +	72.8	27.2	51.04	10.7	50.3
Taconic	53.63	48.0% college +	69.7	30.3	43.38	22.3	50.0
Beaver Complaint	57.87	46.4% college +	75.1	24.9	51.00	94.7	59.9
Nonrespondents (from Mohawk and Taconic strata)	52.6	27.6% college +	42.0	58.0	46.6	3.0	34.0



Table D.2. Preference for future change in beaver population (a measure of wildlife acceptance capacity) for 3 study samples in New York and for survey non-respondents.

<b>Study Sample</b>	<b>Wildlife Acceptance Capacity<sup>1</sup></b> <b>(preferred change in beaver population)</b>			
	<b>Fewer beaver (%)</b>	<b>Current number of beaver (%)</b>	<b>More beaver (%)</b>	<b>Don't know (%)</b>
Mohawk (n=272)	21.2	50.7	28.1	NA
Taconic (n=278)	25.1	44.4	30.6	NA
Beaver Complaint (n=425)	69.5	25.4	7.9	NA
Non-respondents (n=100)	15.0	41.0	13.0	31.0

1. Variable coded on a 9 point scale from 1=no beaver, 3=1/2 as many beaver, 5=current number of beaver, 7=50% more beaver, 9=at least twice as many beaver. Variable collapsed here from 1=fewer beaver, 2=current number of beaver, 3=more beaver.

Table D.3. Comparison of respondent attitudes toward beaver for 3 study samples in New York and non-respondents.

Attitude statement <sup>1</sup>	Response	Mohawk	Taconic	Beaver	Non-
		(%)	(%)	Complaint	Respondents
		(n=249-282)	(n=262-286)	(n=406-438)	(%)
“Beaver are a sign of a healthy environment.”	Agree	65.3	66.0	44.7	72.4
	Disagree	3.7	6.8	18.5	8.2
	Neutral	18.7	18.4	28.4	2.0
	No opinion	9.2	6.1	6.3	17.3
“Beaver pop’s should be controlled.”	Agree	43.2	44.6	86.0	63.9
	Disagree	18.0	24.1	4.9	13.4
	Neutral	28.6	26.5	7.9	8.2
	No opinion	7.1	3.4	0.7	14.4
“Lethal control of beaver would be justified when a beaver floods a public road.”	Agree	28.6	30.6	73.1	55.6
	Disagree	50.7	51.4	17.7	39.4
	Neutral	15.3	14.6	9.2	2.0
	No opinion	3.7	1.4	0	3.0
“Lethal control of beaver would be justified when a beaver damages my private property.”	Agree	35.3	34.2	76.3	54.1
	Disagree	43.8	48.0	10.6	41.8
	Neutral	15.6	15.3	9.0	3.1
	No opinion	3.4	0.7	1.1	1.0
“The rights of people and the rights of wildlife are equally important.”	Agree	64.3	52.1	41.6	75.5
	Disagree	32.6	30.2	43.1	19.4
	Neutral	12.2	12.6	11.7	4.1
	No opinion	0.7	2.0	1.1	1.0

1. Variables coded on a 5-point scale from “strongly agree” (1) to “neutral” (3) to “strongly disagree” (5).