Our Yellowstone: The debate over reintroducing mountain lions into the Adirondack State Park


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EXECUTIVE SUMMARY

The successful reintroduction of gray wolves (Canis lupis) into Yellowstone National Park in 1994 and the dramatic ecological changes after reintroduction have sparked new conversations about reintroducing apex predators to other protected areas that currently lack predators of large ungulates such as the white-tailed deer (Odocoileus virginianus) (Laundré 2011, Bangs and Fritts 1996). The Adirondack State Park in New York state covers approximately 6.1 million acres and conserves over half through state managed land and private easements. Constitutionally mandated to remain ‘forever wild,’ the Adirondack State Park offers large tracts of untouched lands that protect dozens of unique ecosystems and offer refuge to hundreds of vertebrate species and countless plant species, as well as untold number of other kinds of organisms.

Although historically present, gray wolves and mountain lions (Puma concolor) were extirpated from the eastern United States by the late 19th century as a result of deforestation, severely reduced deer herds (approximately 2,000 individuals in 1900) and the overzealous bounty hunting of the two species (Kellert et al. 1996). Although the folklore of the elusive ‘Catamount’ remains intrinsic to local culture throughout the Northeast, state officials contend that the mountain lion is indeed extinct from the region.1 Despite the official stance, locals contend, as a result of rare sightings and encounters that the big cat has indeed returned to the North Country2.

Despite local, off-change sightings, mountain lions have no stronghold in the northeast region of the United States. However, the ecological need for an apex predator has dramatically

1 Dr. John Laundré, personal communication, April 30, 2014
2 Susan Willson, personal communication, April 2014
increased. Simultaneously, reduced agriculture, large reforestation of the Adirondack State Park and demographic shifts in the white-tailed deer herds have led to an exponential explosion in the size and health of the herd (Hurst and Porter 2008). The consequences of an unstable, abundant deer herd in the state have high economic and ecological costs. With little predation on fawns or older deer and growing deer herds, increased costs of agricultural crop loss and car collisions, urban vegetation browsing (flower beds and gardens) and spread of diseases (Lyme disease contractions) will continue to escalate (Curtis and Sullivan 2001). Further, the infamous ‘browsing line’ of white-tailed deer, in which forest understories, below 2 meters, are stripped clean of saplings, herbaceous plants or almost any plant with any nutritional value, has serious implications for the regeneration and ecosystem services of northeastern forests. Beyond ecological implications, local tourism and activities such as fall foliage tourism, spring maple sugaring and local wood and timber mills depend upon the vitality and regeneration of forests.

We contend that the ‘forever wild’ clause, a constitutional guarantee for the citizens and ecosystems of New York, should require the reintroduction of a wild population of mountain lions to (1) increase predation pressure on young/elderly deer and reduce herd size (2) help restore trophic and community structure, primarily to revitalize and increase forest regeneration and (3) bring together federal, state and local officials, organizations and various stakeholders in a combined conservation effort to boost the ecological and cultural importance of the Adirondack State Park.

We chose to focus on reintroducing mountain lions instead of the gray wolf because mountain lions are one of the only top level predator that seems to be naturally expanding its range on its own. Mountain lions are moving east again and successfully reintroducing itself to ranges it was previously extirpated from such as the Black Hill of South Dakota (Laundré 2011,
According to Dr. John Laundre, a biologist who has done extensive research on mountain lion populations and possible reintroductions “us bringing them over that barrier [the Great Plains] would not be much different as if they could move across it on their own via a corridor (that does not exist unfortunately). Judging from the movement of males across the Great Plains, they want to get here but just can’t on their own, at least not in your lifetime. So I tend to view the releasing of mountain lions into the Park, not as a reintroduction but as an “aided dispersal”\(^3\).

Through a survey in which we targeted residents throughout towns within the Adirondack State Park, as well as rural and more urban dwelling individuals in the St. Lawrence County, we gathered valuable information concerning public opinion towards a possible mountain lion reintroduction, including willingness to pay and safety concerns. Further, we gauged public opinion by interviewing local residents, mountain lion experts and state conservation officials that informed us on the feasibility and logistics of mountain lion reintroduction. We also studied and evaluated public opinion regarding the proximately of predators, as well as successful large carnivore reintroductions.

We conclude that despite the costs of infrequent livestock depredation and the possibility of human contact with wild mountain lions, which could result in injury and/or death, that the ecological and economical costs of reintroducing mountain lions is both necessary and appropriate in the Adirondack State Park. Public outreach and education is critical before reintroduction and must include all potential stakeholders of a reintroduced mountain lion population. Reintroductions must by systematic and appropriate within specific areas of the Park. Concentrating initial reintroduction of mountain lions in western, publically protected forested

\(^3\) Dr. John Laundre, personal communication, April 30, 2014
areas with little development will reduce mountain lion fatalities and increase the program’s success (Laundré 2011). Finally, we conclude that long-term monitoring of mountain lions must include population surveys, individual tracking as well as widespread ecological surveys that focus on environmental and community changes after reintroduction. State officials need to adapt management plans for possible scenarios for fatalities or hostility. However, we conclude that the reintroduction of mountain lions can be as successful as Yellowstone’s reintroduction of wolves and will bolster the ecological, cultural and economic prospects of the Park’s future (Smith et al 2003).
PROBLEM DEFINITION

The lack of an apex predator in the Adirondack State Park, which contains diverse ecosystems and abundant vertebrate biodiversity, is problematic for many ecological and economic reasons, as well as the Park’s ‘Forever Wild’ mandate. The absence changes the natural structure of the ecosystem to one that has been influenced and modified by humans (i.e. no apex predators resulting in an increase in deer populations). Although how to divide up the use of land within the Park, how much to keep for human use and how much to put away as wilderness is widely contested between individuals and organizations, the significant problems facing the Park necessitate the reintroduction of mountain lions. However, we believe the scientific basis for reintroduction cannot drive management decisions alone. We will carefully examine both the scientific necessity for mountain lions while also considering public and professional opinion and examining past large carnivore reintroductions. Careful consideration of the potential benefits and costs for mountain lion reintroduction, including economic, cultural and ecological parameters, will be used to help ground our recommendations.

The Adirondack State Park makes up one third of the total land in New York State. It was created in 1892 in an effort to conserve and protect the Park against resource extraction such as deforestation. The park was created “to be forever reserved for the free use of all the people.” However, resources were still being extracted from the Park. In 1894 the “forever wild” clause was added to the constitution, essentially promising the people that the Park, or at least parts of it would remain protected and forever in its original unaltered state. In 1973, the legislature created a law known as the Adirondack Park Land Use and Development Plan. This law governed the use of private land within the Park. “Under the Act, all private lands in the Park are classified into one of six categories: Hamlet, Moderate Intensity, Low Intensity, Rural Use, Industrial Use,
and Resource Management (Adirondack Park, 2003).” Roughly 43% or 2.6 million acres of the total six million acres of the Park are state-owned and managed lands. The rest is privately owned. The Park is home to about 130,000 residents (Laundré 2011)
The above map depicts how lands are designated and managed within the Adirondack State Park. For the purpose of this study it is not necessary to understand or know what each piece is designated as and what the guidelines are for each designation. What is important is to understand how these differences in management practice might play into a mountain lion reintroduction plan. Due to the different regulations it would be challenging to manage a reintroduction and it would require that the plan be customized and address each land designation and their respective practices.

A large concern regarding the lack of apex predators in the Adirondack State Park and neighboring counties is the recent explosion in white-tailed deer herds. While some county herds are currently listed as unstable, the general trend throughout the past century has been a dramatic statewide increase from under 2,000 deer in the 1900s to over 1 million in 2000 (Curtis and Sullivan 2001). Recent land development changes within the Park, including greater urban developments, abandoned fields intermixed with active agriculture and reforestation resulting in abundant conifer hardwoods has helped develop an environment with abundant food sources. Indeed, New York farmers accounted deer grazing for over 59 million dollars in crop loss and over 25% of them attributed deer-related destruction as a significant factor towards lost profitability (DEC 2011).
The New York Department of Environmental Conservation released the above map in 2013. It shows the desired population change they would like to see for each deer population. The population that falls within the Adirondack State Park is designated, as a population the New York DEC would like to stabilize. The populations surrounding the Park are ones they would like to decrease. Further, despite a concerned hunting community, which often points to a low density of deer within the Adirondacks, actual census data shows that the current deer herd has rebounded and is approaching a record-high number (Debate Over Deer 2011). Ed Reed, a DEC wildlife biologist claims that the planted evergreen plantations have matured enough to provide suitable winter shelter and food for deer herds. The population is slowly growing, with an expected growth between 20-30% over the next few centuries, dependent on the harshness of
winters. Further, although the deer population has grown, deer herds have exploded in more developed sections of the Park, including the periphery, which has resulted in new wintering sites that often come into contact with humans (Debate Over Deer 2011, Hurst and Porter 2007).

Simultaneously increased human-deer contact and property destruction through grazing and car collisions have spiked (Curtis and Sullivan 2001). Over the past decade, between 60-80,000 deer-related vehicle collisions occurred statewide, incurring millions of dollars in financial costs as well as human fatalities (DEC 2011). The change in forest-agricultural mosaic, accompanied with more uncertain winter patterns has caused white-tailed deer to shift their overwintering patterns. Deer now concentrated in regions with abundant young conifer forests and urban areas, both problematic areas for two separate reasons. Urban areas means the deer are more likely to come into contact with people becoming a nuisance (garden damage) or dangerous (car collisions). Young conifer forests are problematic because the deer could damage the structure of the forest do to their habits of feeding on buds and new growth. These issues have prompted concerns over conservation and regeneration of the young successional forests frequently found throughout New York (Hurst and Porter 2007).

The current situations seen in many forests are an extensive ‘browse line’ below the reach of leaning adult deer, or about 2 meters in height. Deer select for the most palatable, energy-rich vegetation sources, especially during winter months and often target sapling bark and buds. Hindrance of forest regeneration has ecological implications beyond forest succession and tree species regeneration; a cleared forest understory, provides accessible environments for invasive species and browse-tolerant ferns (Horsley et al. 2003). The implications of damaged red maple, birch and oak regeneration for surrounding ecological interactions is widespread. Deer-related tree browsing reduces the abundance of forest-breeding birds, food availability for small
mammals and trophic interactions (DEC 2011, Nilsen et al. 2007, McShea and Rappole 2000). While much of the private-owned land throughout the Adirondack State Park is regenerating well, much of the public land and forest preserve is deteriorating with age as deer populations spike (DEC 2011). Although the DEC contends that extensive ecological restoration through planting fruit and nut trees and woodland meadows can support augmented herd size, we contend the evidence of both physical damage and recent deer demographics demands a top-down trophic approach rather than a bottom-up solution.

The DEC in its most recent management strategy for controlling deer populations charges itself with ‘reduc[ing] the negative impacts of deer…promot[ing] healthy and sustainable levels and enhance[ing] habitat conservation efforts [by]…ensur[ing] that the necessary resources are available to support the proper management of white-tailed deer” (DEC 2011). Although legally mandated by the Environmental Conservation Law to improve and maintain biodiversity and natural resources, the DEC’s management strategy for managing deer populations is through revised hunting regulations and public outreach and education (DEC 2011). Further, research examining coyote behavior within the Park concluded that the predation of deer by the canines rarely impact the population of the herds throughout the Park. Only an extremely adverse winter accompanied by high coyote densities resulted in a high predation rate of fawns (Debate Over Deer 2011). Both natural and human controls which exist within and outside of the Park are not doing enough to control and manage deer populations to sustainable or balanced growth.

While we consider rifle and bow hunting a critical component to New York’s economy and cultural heritage and public education imperative for future conservation, we contend that the state and officials should do more to manage state biodiversity such as reintroduce an apex predator and managing the deer populations. Indeed, Curtis and Sullivan (2001) who outline the
extensive monetary damages caused by unmanaged deer herds, provide a list of intrusive and expensive repellents and physical barriers to hinder deer. However, the potential environmental consequences of spraying gallons of ‘Miller’s Hot Sauce Animal Repellent’ or ‘Tree Guard’ is unknown, as well as for 12-foot tall electrified fences, all potential steps the DEC or private citizens could do to manage very small scale problematic populations of deer.

While these devices help to limit the interaction between humans and deer, stakeholders within and outside of the Adirondack State Park must realize that the ‘Forever Wild’ constitutional guarantee should prohibit such intrusive measures. While such measures taken by state officials and land owners can help manage deer herds and limit property destruction, a biodiversity improvement approach for management and conservation should be closely considered and put into action. Restoring apex predators is one such possible management strategy. Nilsen et al. (2007) developed a model that shows how possible reintroduction of wolves could have considerable effects on managing red deer (Cervus elaphus) while also making obsolete the state mandated expensive, controvertible culling practices. We contend the state’s mandate, as well as the ecological and economic imperatives suggest that an apex predator reintroduction into the Adirondack State Park could dramatically reverse current demographic and ecological trends caused by white tailed deer populations that are too high.

Public opinion is one of two critical components to any reintroduction of a large carnivore (Laundré 2011). Without broad consensus throughout communities and stakeholders regarding large carnivores, any reintroduction measure will likely fail. Census data taken from other regions considering possible large carnivore reintroductions (Scotland and Colorado) show a large disconnect between urban and rural communities’ opinions (Nilsen et al. 2007, Pate et al. 1996). In rural, farming communities, opinions towards large carnivores reflected concerns
primarily about livestock loss and human harm (Nilsen et al. 2007, Bueno-Cabrea 2005). Further, the morality towards possible human-predator interactions was largely indicative of the community location; rural communities had no moral imperative towards preserving intrusive carnivores while urban stakeholders strongly disagreed with predator fatalities (Pate et al. 1996).

The urban-rural divide was also evident within opinions over ecological responses to predator reintroduction. While urban residents saw wolf reintroduction as a means to ‘return the natural environment to the way it was,’ ‘keep deer and elk populations in balance,’ and ‘help people understand the importance of wilderness,’ rural communities had contrasting, negative opinions (Pate et al. 1996). Rural stakeholders responded overwhelmingly against predator reintroduction due to concerns over human fatalities, concerns over expanding predator ranges and livestock depredation (Nilsen et al. 2007, Williams et al. 2002).

Further, rural and agricultural stakeholders seem remain the most opposed to large carnivore reintroduction. Simultaneously these individuals and organizations live in close proximity to regions where carnivore reintroductions are proposed. The only ways to inhibit human-predator contact or conflict would be fenced eco-pens or enforcing human resettlement. Both options are not desirable or cost-effective. Hence, prior education outreach as well as consideration and inclusion of rural stakeholders in management decisions will be critical for successful conservation. Recent research can be used to help guide public acknowledgement of the cost benefits from mountain lion reintroduction, while also quelling rural concerns and the cultural myths regarding predators. The possible economic benefits of large predator reintroduction include the reduced need for expensive ungulate control measures, larger returns on trophy stags (less competition for resources) and a vast reduction in contracting Lyme disease (Nilsen et al. 2007). Laundré el al. (2006) found those unpredictable, harsh winters, not increased
mountain lion predation, were the catalyst behind decreased mule deer yields in western states. The effect of reintroducing large predators on the quality and quantity of game are major concerns throughout the United States. However, behavior analysis of mountain lions show that weak, ill or fawns are the primary target for hunting, which actually increased the vitality of herds and individuals (Laundré et al. 2007, Nilsen et al. 2007).

With the clear implication that the economic, ecological and social components of the Adirondack must be studied, surveyed and likely changed before the reintroduction of the mountain lion can occur, feasible solutions must be derived. But first, it is imperative to identify and determine the stakeholders in this particular problem. Who are they? What do they have at stake, in terms of cost and benefits, from inaction or reintroduction? Identifying the issues that must be addressed and devising solutions must take place before reintroduction can occurs.
METHODS

For our study, we used three basic methods to gather information. We used surveys, personal communications and literature research. We needed to gather both subjective and objective information.

Survey Methods

Once we drafted our survey, submitted it to the Internal Review Board and received approval. Our survey was conducted through the postal service and St. Lawrence Campus Mail. We sent out surveys with prize cards and self-addressed envelopes. For a copy of the survey instrument used please see Appendix A. The prize was comprised of a $50 gift card to a local business (grocery store, Wal-Mart, etc.) in order to incentivize individuals to complete and return surveys. The separate paper identified each individual survey for the lottery prize, keeping separate the actual survey and surveyor’s identity anonymous.

Using GIS-based software, we randomly selected addresses within Saranac Lake, Tupper Lake, Lake Placid, Parrishville, and Canton, selecting individuals that reside in urban and rural localities, including farmers. Our geographic range included towns in the Adirondack Park (individuals who will likely have first direct contact with mountain lions) and within St Lawrence County (individuals who will have later, delayed but probable encounters). Within our survey, we asked for background information regarding education level, occupation and age. Because of the implications of mountain lion reintroduction and possible livestock loss, it is important include the opinions of the region’s many farmers. Some questions were left blank, with no multiple choice or selected response.
Our survey questions followed a methodology of ‘yes or no,’ the basic Likert scale methodology as well as some responses left open-ended to allow for people to write in their own thoughts. Not only did we ask basic questions about mountain lions, whether or not people believe they exist in the Adirondack Park, how people would feel about their presence and basic demographic questions, we also used the New Ecological Paradigm in order to help glean in if there are similarities between people’s feelings about mountain lions and people environmental ideologies. See Appendix A for more details about the questions that were asked.

**Interview Methods**

We interviewed people that had experience with mountain lions, either because they had seen what they thought was a mountain lion because they had experience with mountain lions. The purpose of personal interviews was to gain either local knowledge about whether or not mountain lion individuals were present or to glean knowledge about whether or not it is biologically feasible to reintroduce mountain lions to northern New York. Specifically, we interviewed Dr. John Laundré of SUNY Oswego, who is an expert on predatory mammals, specifically mountain lions, and who has also conducted feasibility studies of reintroduction in the Adirondack State Park. We also spoke with an employee of the DEC, Scott Van Arsdale, in order to get a better idea about the DEC’s perspective about mountain lions, the health of the deer population and other problems and concerns facing the future of the Park. Scott has personally written about local sightings of mountain lions by community members and discussed the feasibility of whether mountain lions already inhabited the area.
Literature Methods

We looked at both news and magazine sources as well as primary and secondary literature to gain a better understanding of issues such as the general public’s overall attitude about mountain lions, the way other states manage their mountain lion populations and how they allocate their funds. Literature research also led us to finding people who would be helpful to interview such as experts in the field of top level predator management and reintroduction.

Survey Results

We analyzed our survey data by calculating the average responses of “yes or no” questions as well as calculating the mode, or most common answer for the Likert questions. Of the 150 surveys we sent out, we received 21 surveys back, or 14% response rate.

Table 1. Survey questions and responses from surveys examining mountain lion reintroduction.

<table>
<thead>
<tr>
<th>Survey Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Do you believe currently there are mountain lions in your area?”</td>
<td>57%</td>
<td>43%</td>
</tr>
<tr>
<td>“Should New York State officials consider reintroducing mountain lions in Adirondack State Park?”</td>
<td>24%</td>
<td>76%</td>
</tr>
<tr>
<td>“If you think mountain lions should be reintroduced into the Adirondack State Park, would you be willing to pay a tax in order to facilitate the reintroduction?”</td>
<td>14%</td>
<td>86%</td>
</tr>
</tbody>
</table>

Beyond the simple “Yes or No” responses, we also evaluated the responses that corresponded to questions pertaining to mountain lion reintroduction based on the Likert scale. We found that the most common answers pertaining to concerns over the livestock loss, personal experiences in the Adirondacks and feelings of potential safety in the wilderness were either “concerned or very concerned” or “significantly impacted” by the concept of potential...
reintroduction. These results coincided with a relatively high average score for the NEP (mean of 52.7). Thus, based on the initial findings of our surveys, a large amount of public education and involvement will be necessary for a successful reintroduction to occur. Although many respondents claimed to have seen or heard about sightings, the likely concerns over safety and wellbeing likely came from myths or cultural perceptions of predators, rather than personal experiences or factual information. Thus, it is critical that public education target specific concerns and convey facts to help relieve concerns over the consequences of mountain lion reintroduction.

Table 2. Survey questions and mode answers that pertain to impact of mountain lion reintroduction.

<table>
<thead>
<tr>
<th>Question</th>
<th>Most Prevalent Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>“How worried would you be about mountain lions in your area (choose one that applies)?”</td>
<td>3-Neutral</td>
</tr>
<tr>
<td>“How concerned are you about the threat posed by mountain lions to domestic animals or livestock?”</td>
<td>4-Worried</td>
</tr>
<tr>
<td>“There are too many deer in my area”</td>
<td>2-Disagree</td>
</tr>
<tr>
<td>“I would feel less comfortable in the backcountry of the Adirondack State Park if mountain lions were present.”</td>
<td>4-Agree</td>
</tr>
<tr>
<td>“I think more people would visit the park if mountain lions were present.”</td>
<td>2-Disagree</td>
</tr>
</tbody>
</table>
IDENTIFICATION OF STAKEHOLDERS

For the purpose of our case study, a stakeholder is a person or party that has a stake or an interest in the reintroduction of mountain lions. Any group that would be affected in some way by the reintroduction of mountain lions should be considered a stakeholder and their wants and needs must be considered, especially when trying to implement a successful solution. Perhaps the most obvious stakeholder in the issue of a potential reintroduction of the mountain lion in the Adirondack State Park are the full-time and part-time residents of the Adirondack Park as they’d be most affected by any repercussions (positive or negative) of the reintroduction (Adirondacks could support cougar comeback [updated 2013]). They would also be living most closely with the reintroduced mountain lions and therefore will likely be among the first to be affected. They would likely have concerns for their livestock, domestic pets, and young children. As taxpayers that live in the Park, their money would likely go towards some aspect of the reintroduction and therefore it is important to acknowledge them with as stakeholders. Another important stakeholder to consider would be the visitors to the Park. Tourism will likely be affected by the presence of mountain lions, either positively because people want to see them or negatively because people are frightened of them. Farmers and those who rely on agriculture for their income would be important stakeholders to consider given the fact that there could be some potential, albeit small, livestock loss due mountain lion reintroduction. Hunters would be another specific example of people as stakeholders as mountain lion reintroduction would most likely directly affect the population of the White-tailed deer and could reduce the amount of deer tags given out per year (Ghost cat [updated 2001]).
As the name implies, the Adirondack State Park is a state run and managed park, therefore the state of New York would also be a major stakeholder in this issue. As discussed later in the Governmental Issues section of this paper, the main branches of the state government we are referring to are the New York Department of Conservation (DEC) the primary government body charged with managing the ecosystems and wildlife of New York and the Adirondack Park Agency (APA), the main governing body of the Adirondack Park. The DEC and the APA would be in charge of managing a mountain lion population with the state of New York. They would need to fund the project, monitor it and most likely be responsible for the success or failure of the project. They would also likely be a large part of the education piece of our proposed management plan.

The environment itself is a very important, and often times completely overlooked stakeholder. If the definition of a stakeholder is a group or party that is affected by the reintroduction of mountain lions than the environment would certainly be a stakeholder and a very important consideration while developing solutions. The environment will either be positively or negatively affected by the reintroduction of mountain lions. The whole point of examining this issue of a potential mountain lion reintroduction is because we would like to find a way to better the overall ecosystem of upstate New York. The goal is to create a stronger and more diverse ecosystem. With that in mind, overlooking the ecosystem and environment itself as a stakeholder would be to lose sight of our initial goal. At its very core, the goal of conservation biology is the protection and management of biodiversity. If a successful management plan means an increase in biodiversity, then it would also be appropriate to consider biodiversity as a stakeholder in this mountain lion reintroduction plan.
Part of understanding the problem of too many deer in and near the Adirondack State Park and the suite of ecological problems that go along with that over abundance of deer as well creating a viable and successful solution, it is important to understand the governments that are involved in the management of the Adirondack Park and the land management of the surrounding land. It is necessary to understand what laws are manage the land and who’s laws they are as well as what kind of potential conflicts could come with these laws and land management practices.

**Adirondack Park Agency**

Primarily the Adirondack Park Agency (APA) manages the Adirondack State Park. The mission of the APA is to “protect the public and private resources of the Park through the exercise of the powers and duties of the Agency as provided by law. The Adirondack Park is a unique pattern of public and private lands, which Agency Members and Staff envision as a vital and sustainable landscape of varied natural settings, healthy biodiversity, human use and settlements. We will seek a balance of conservation, protection, preservation, development, and use of the resources of the Adirondack Park. We will work in partnership with individuals and institutions to recognize, foster, and share stewardship of the Park. We hope for shared understanding and appreciation of the Park by all (Adirondack Park Agency, 2003).” The APA was established in 1971 by the New York State government in order to help develop and manage a long term plan for the land both private and public within the Adirondack Park. It is made up of an 11 member board with a staff of roughly 60 people (Adirondack Park Agency, 2003). Eight of the eleven board members must be members of the state of New York that are not
employed by the state in any capacity. They are appointed by the governor and then approved by the senate. Of the eight, five of them must live within the Adirondack Park itself, each from a different county. The other three are the heads of the Department of Environmental Conservation, the Commissioner of Economic Development, and the Secretary of State. No more than five members can be a member of the same political party (Political History, 2000).

The APA was created because, though a state park, the NY DEC had no real jurisdiction over the development that went on within the Park on private lands. The goal of the APA was to bridge this gap in management. This meant that the APA would be able to tell people what they could and could not do with their private land, a very controversial idea. When the APA was first created, it developed two plans, the State Land Master Plan, and the Adirondack Land Use and Development Plan. The State Land Master Plan states:

“A wilderness area, in contrast with those areas where man and his own works dominate the landscape, is an area where the earth and its community of life are untrammeled by man - where man himself is a visitor who does not remain. A wilderness area is further defined to mean an area of state land or water having a primeval character, without significant improvements or permanent human habitation, which is protected and managed so as to preserve, enhance and restore, where necessary, its natural conditions, and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least ten thousand acres of land and water or is of sufficient size and character as to made practicable its preservation and use in an unimpaired
condition; and (4) may also contain ecological, geological or other features of scientific, educational, scenic or historical value (Political History, 2000).

The Adirondack Land Use and Development Plan also divided lands up into different categories and determined what sort of development could happen on each type of land. “The APA again divided the land up into several different classifications based upon intended use. These were industrial use, which was the least restrictive; hamlet; moderate intensity use; low intensity use; rural use; and resource management, which was the most restrictive. Lands owned by paper companies or sportsmen's clubs, such as the Adirondack League Club south of Old Forge, typically fell into the category of resource management. Further, the plan divided all proposed development projects into two categories: large-scale projects, or Class A; and small-scale ones, termed Class B. Class A projects required the direct approval of the APA, while Class B projects would be approved by the government at the local level” (Political History, 2000). Though the APA is the primary governing body of the Adirondack Park, it is a branch of the New York State government.

New York Department of Environmental Conservation

The New York Department of Environmental Conservation otherwise known as the NYDEC is a branch of the New York State Government that is responsible for the management of the New York’s ecosystem health and natural resources. Their mission: "To conserve, improve and protect New York's natural resources and environment and to prevent, abate and control water, land and air pollution, in order to enhance the health, safety and welfare of the people of the state and their overall economic and social well-being (Aboue DEC, 2014)."

According to their mission they seek to promote not only environmental justice but improve
social well-being as well. The DEC is made up of a commissioner and executive managers. The DEC splits the state of New York into nine different regions the regions that pertain to this case study are regions 5 (Eastern Adirondacks/Lake Champlain) Clinton, Essex, Franklin, Fulton, Hamilton, Saratoga, Warren and Washington counties) and 6 (Western Adirondacks/Eastern Lake Ontario) Herkimer, Jefferson, Lewis, Oneida and St. Lawrence counties (About DEC, 2014). Though the DEC does enforce laws within the Adirondack State Park, such as the Freshwater Wetlands Act, the Adirondack Park Agency is the main governing body within the Park itself.

Outside of the Park, in areas such as the St. Lawrence River Valley, the DEC has much greater jurisdiction. The DEC’s responsibilities include:

- Regulate the disposal, transport and treatment of hazardous and toxic wastes in an environmentally sound manner;
- Manage the state program for oil and chemical spills;
- Provide for the abatement of water, land and air pollution, including pesticides;
- Monitor environmental conditions and test for contaminants;
- Encourage recycling, recovery and reuse of all solid waste to conserve resources and reduce waste;
- Administer fish and wildlife laws, carry out sound fish and wildlife management practices, and conduct fish and wildlife research;
- Manage New York's marine and coastal resources;
- Conduct sound forestry management practices on state lands, provide assistance to private forest landowners and manage fire prevention and control efforts;
- Manage the Adirondack and Catskill forest preserves and recreational facilities, including campsites;
- Protect tidal and freshwater wetlands and flood plains;
- Promote the wise use of water resources;
- Administer the wild, scenic and recreational rivers program;
- Regulate mining, including reclamation of mined lands, extraction of oil and gas, and underground storage of natural gas and liquefied petroleum gas;
- Inform the public about environmental conservation principles and encourage their participation in environmental affairs (Administration and Enforcement, 2014).
These responsibilities come out of the Environmental Conservation Law. The Environmental Conservation Law is the law that established the DEC and defined their role within the government (Administration and Enforcement, 2014).

**Frustrations with the New York Department of Environmental Conservation**

Many members of the St. Lawrence River Valley and the Adirondack State Park have expressed frustration with the New York DEC over their assertion that there are no mountain lion individuals present in this area, despite the numerous reported sightings. According to the New York Department of Environmental Conservation the last wild cougar in New York State was killed in 1894 (Van Arsdale, 2008). We would assert that this is probably correct. It is highly unlikely that there are breeding populations of mountain lions within New York State. It seems unfeasible that there are such breeding populations yet little to no evidence. If there were breeding populations there would almost certainly be signs of them such as mountain lions killed due to vehicle accidents, greater evidence of mountain lion kills and other evidence such as tracks, and scat, similar to what people see almost daily pertaining to deer populations, coyote populations and even bear populations. Hardly any of which has been reported reliably in New York State. However, it is entirely possible that though there are no breeding populations of lions, there could still be transient individuals. However, the DEC has stated there are no individuals whatsoever within the state of New York. Since the time of their declared extirpation the DEC has maintained that there are no cougars in the State of New York and that those who have reported a sighting in the state of New York have mistaken the identity of a more common animal with that of a mountain lion. This of course begs the question, what is it that people are
seeing? Certainly it is possible for the layperson, not used to identifying wildlife to misidentify a bobcat, fox, coyote or perhaps even housecat as a mountain lion.

So, what is it that can account for this discrepancy between the alleged mountain lions sighting and the fact that the DEC claims they are not in the area at all. Perhaps the most simple and straightforward answer is that the DEC is in fact correct, there are no mountain lions within the Adirondack Park or the St. Lawrence River Valley and what people are seeing is some organism other than a mountain lion. It is possible that for one reason or another, many people are either incorrect or dishonest in their identification of cougars not only within the state of New York, but surrounding states as well. For some reason people often times stage photos of cougars or simply misrepresent a photo of a cougar in another area as being from New York State. Other times photos lack the proper evidentiary support such as proper scale, time stamp or enough background to prove the photo was not staged. In the case that they do acknowledge a cougar sighting as correct, they claim that it must have been bred in captivity and then released into the wild (Leahy, 2006).

However, some compelling evidence has been provided that suggests that mountain lion individuals are present in this area, albeit temporarily. Figure 1 depicts a photo captured by a trail camera set up in Canton, NY. After suspected mountain lion activity in her area and evidence that included a goat allegedly killed by a mountain lion, Dr. Susan Willson, an associate professor of Biology at St. Lawrence University set up trail cameras in the hopes of catching an image of the lion. She submitted the photo to the DEC and they responded by saying it was a raccoon tail. Figure 2 shows a raccoon tail for comparison. Though incorrect and falsified mountain lion sightings are certainly prevalent, it seems unlikely that every single
reported sighting to the NY DEC is an incorrect identification so why is there still so much of incongruity?

If it is true that in fact there are mountain lions within the Park and the St. Lawrence River Valley and the Adirondack State Park, and the New York DEC is hesitant or withholding information about the presence of mountain lion individuals within this area, some of the answers could have their roots in financial or political reasons. If the NYDEC does state that mountain lion individuals are present in this area even temporarily, then they are legally responsible for managing them which means they are responsible for financing them. As part of the reasonability of the NYDEC under the Environmental Conservation Law they have the legal responsibility to manage wildlife population within the state of New York.

![Photo Courtesy of Susan Willson](image-url)

Figure 1. Trail Cam Photo of Mountain Lion Tail
How Does the US Fish and Wildlife Service Fit In?

A similar story goes for the US Fish and Wildlife service (FWS), the national branch of the government that oversees wildlife management in the United States. In 2011, the eastern cougar was declared officially extinct by the FWS (Officially extinct 2011). Though, it does still remain a protected species under the Endangered Species Act (Protect!, 2013) that status is currently up for review since extinct species are not eligible for aid under the Endangered Species Act. Certainly these issues of funding and management could play a role in terms of whether or not these state and federal governments would acknowledge the presence of mountain lions, even transient individuals within regions east of the Mississippi River.

Similarly, if mountain lions were to be reintroduced into the Adirondack State Park and the St. Lawrence River Valley, it would take work, management, and funding on the part of both the New York DEC and the US Fish and Wildlife Service. However, since the Park is a state
managed one the reintroduction and management process would be governed predominately by the New York DEC.

**How do other governments manage established populations?**

Historically, in areas with well established populations, namely those to the west of the Mississippi River, the management of cougar populations was primarily for anthropological services, such as game hunting, “The species was placed under the authority of the various state game agencies. It was a case of placing the fox in charge of the henhouse. The protection lions received was from commercial hunters. In season (which in some states is year round) any hunter willing to pay the few bucks needed for a hunting tag could now legally kill any lion. And while the barbaric practice of paying a bounty for dead lions ceased, discrete “Wildlife Services” programs were created to lethally "remove" lions that preyed on domestic livestock or threatened game herds. Once again, tax dollars paid for these kills (Cullens et al. 2012).”

The following is an example of Arizona’s management objectives for their cougar populations:

“The Department's goals are to manage predators in a sustainable manner integrating conservation, use, and protection, and to develop the biological and social data necessary to manage predators in a biologically sound and publicly acceptable manner. Overall, mountain lion hunting is meeting the Department’s management objective of maintaining an annual harvest of >250 animals/year and providing recreational opportunities for >6,000 hunters per year. Harvest and tag sales have met or exceeded these levels during recent years (Cullens et al. 2012).”
Certainly this management-by-hunting strategy would not apply in the case of a potential reintroduction of an eastern population, though it is more than likely that in part, the money would have to come from the New York taxpayers, a price that not everyone is willing to pay. It could be a tricky sell for both the federal and more importantly the state government to get citizens on board with the reintroduction project, a sell that would certainly require education and very careful management on the part of both governments.
DEVELOPMENT OF SOLUTIONS TO THE PROBLEM

Parameters for a Feasible Solution

The controversies surrounding the possible reintroduction of the mountain lion in the Adirondack State Park are complex. Human opinions cannot solely determine the outcome of the feasibility of the reintroduction, nor can the ecological necessity ignore the concerns of various stakeholders. Because of the complexity and various degrees of involvement from individuals throughout the Adirondack State Park, it is likely that not one solution will be deemed ‘universally satisfactory.’

If mountain lions are reintroduced, many individuals will be upset by the likely decision and management strategies, while the same will be true in the opposite solution, if intrusive bio controls are used for deer management. Thus, it is imperative that the solution to the problem of mountain lion reintroduction seeks balance. The desired solution should seek to maximize the potential benefits for all stakeholders while minimizing the potential costs, including antagonizing individuals. To minimize costs associated with mountain lion reintroduction, all concerns of stakeholders should have fair consideration and be weighted equally with simple costs and benefits of different solutions. To maximize the various stakeholders’ benefits from the possible mountain lion reintroduction, a possible solution must include concerns from both humans and environment in terms of costs and benefits from reintroduction or other potential solutions.

First, any solution must address the concerns and potential costs of stakeholders. Without broad consensus from the various stakeholders within Adirondack communities, any measure for reintroduction will fail. Without including individuals such as rural landowners, hunters, hikers or others that extensively use land within the Adirondacks and have the potential for direct
mountain lion encounters, increased mountain lion fatalities will likely occur. Solutions will be successful only if inclusion and benefits are derived from the management decisions. Thus, solutions must insure that stakeholders are not antagonized or isolated within larger communities after management decisions are made. If hunters are not included in the process of determining the fate of mountain lions, then subsequent measures will likely fail. Further, if mountain lions are reintroduced, education campaigns must first insure a majority of the stakeholders properly understand and respect the mountain lion as well as both comprehend and contribute to the ultimate goals of reintroduction and proper management.

Secondly, any solution must account for the ecological and environmental impact of reintroduction. It is absolutely necessary that the environment in which the mountain lions are reintroduced can both sustain and foster a healthy population (Laundré 2011). Further, it critical that the ecological benefits of reintroduction exceed the ecological costs, whether this are managed deer populations or forest regeneration. Solutions shouldn’t adversely affect the balance of the Adirondack State Park. Determining the effects of possible solutions on future deer projections and other indirect effects towards such as biodiversity of songbirds and the abundance of other predatory mammals (coyotes and black bears) will also be important to determine from possible solutions concerning reintroduction.

Thirdly, it is important that management decisions and possible solutions are driven by robust data and facts from various studies before and during management decisions. Not only is it important that data regarding public opinion and involvement as well as economic impact be included in the feasible solution, but also that behavioral studies, ecological surveys and population analysis be weighted heavily. It is critical that neither public opinion nor scientific necessity silence the other. Further, the benefits derived from the environment and the humans
within the Adirondack State Park should be distributed as equally as possible. This includes not only discussing the possible benefits during public education, but also that management decisions solely not reflect an environmental need or benefit at the cost of humans in the Park. A possible solution will be deemed feasible if officials and organizations that will conduct management of the mountain lions meet the above requirements all as well as further consideration.

**Identification of Potential Solutions:**

In the following section we will outline and evaluate the possible solutions to the problems associated with reintroduction of the mountain lion to the Adirondack State Park. Solutions will address whether the two categories of problems that must be addressed whether or not mountain lions are reintroduced. Both the public opinion and involvement of various stakeholders within the community and the ecological and landscape conditions within the Park should determine the feasibility for a reintroduction. The following solutions are listed not only in the order of the potential monetary and temporal costs (positive and negative parameters) but also in the order that would need to occur before a successful mountain lion reintroduction scheme occurred. The rational for this specific ordering of solutions is that one solution is not the means for successful reintroduction, but rather for the implementation and possible success of another solution. Ultimately, although later solutions contain more difficulties and costs, each solution is designed to help bolster the success of subsequent solutions as well as the ultimate aim of mountain lion reintroduction. Whether the reintroduction of mountain lions will be successful is determinate on if all of the solutions are deemed feasible and are considered successes.
First Solution: Survey Stakeholders

Public opinion and involvement will be critical in determining whether or not the reintroduction of mountain lions will either occur or be successful. With survey data from prior studies examining large carnivore reintroduction, as well as this study’s own survey data, it is critical that public officials and environment organizations have an extensive and inclusive education campaign. Regardless of age, gender or education level, survey data of towns throughout and bordering the Adirondack State Park show considerable hesitation to the possibility of reintroducing mountain lions as well as concerns over the safety of humans and animals.\(^4\) Although more formal and extensive surveys have yet to be conducted and measure public opinions, the overwhelming responses of individual concerns and a prevalent unwillingness to pay for reintroduction must be overcome if a viable solution for reintroducing mountain lions can occur in the Park.

A systematic survey of the Adirondack region should be completed before any extensive public campaign for reintroduction begins. This is necessary for several reasons. A preliminary poll can give state officials and organizations the information necessary for the following parameters in any education outreach: (1) which concerns over mountain lions are the most severe and the most prevalent (2) which areas express the least willingness to support mountain lion reintroduction and express the most concerns about the species and (3) have individuals address other environmental conditions or problems within the Park that may be dependent or independent of any potential mountain lion solution. By beginning to involve various stakeholders in the initial discussion about mountain lions, parameters 1 and 3 would be satisfied. A comprehensive survey would not only help begin to involve various stakeholders with

\(^4\) IRB Survey by Self and McIvor 2014
management decisions without conflict or antagonizing specific individuals. Also the comments and questions could of stakeholders inform officials on the original feasibility of mountain lion reintroduction and alternatives to an apex predator. The data and questions gathered by the survey would help public officials devise new management strategies for the Park as well as prepare for the next possible steps for reintroduction. While improvements in the ecology and landscapes of the Adirondacks would likely not directly improve from the survey, beginning conversations and public awareness about problems could indirectly derive benefits for the environment. While this solution should be more of a means to a further solution and not the final product, it can bring about information and conversation that focuses on the positive benefits of an apex predator reintroduction without discrediting stakeholders.

**Second Solution: Educate and Inclusion of Stakeholders**

Public education and outreach by the APA and the DEC is a strategy that cannot only bolster the public’s awareness about a specific environmental concern, but also help overall awareness. Based on interviews and the results preliminary survey data, regions within and surrounding the Adirondack State Park are in desperate need of both environmental outreach and education about various topics, many unrelated to mountain lion reintroduction. Randomized, rare phone calls or few public discussions will not only cause apathy of communities towards environmental awareness, but also have disregard or misinformation about environmental management decisions that affect their daily lives.5

Both the APA and DEC, who are responsible for managing the wilderness and ecosystems within and surrounding the Adirondack State Park, should concentrate more effort

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5 Scott Van Arsdale, Personal Communication, May 1 2014
into educational outreach to the general public. It is critical that these educational programs do not solely focus on the reintroduction of the mountain lion, nor falsely accuse individuals of misinformation. The threats of mountain lions are real. Depredation, stalking and quite possibly human fatalities may arise from reintroduction. However, the many positive benefits of mountain lion reintroduction and the truths of their behavior and ecology should be presented in a simple manner that focuses on stakeholder participation and education. The participation will be critical for engaging the public audience with officials in the meeting (i.e. questions, comments, further meetings) and beyond the educational (forging ties between community members and officials for management decisions).

The sole focus of the extensive public outreach should not be helping convince the Adirondack communities that mountain lions should be reintroduced. Instead, the topic of conversation should also include information about the deer herd, land easements and conservation and the future of ecology and economy of the Park. Further, the education outreach should focus on targeting specific stakeholders for discussion and inclusion within management decisions, whether the decisions include mountain lions or not. The outcomes of dialogue and inclusion with groups such as rural communities and hunters, who often adamantly oppose mountain lion or other predator reintroduction could have potential positive outcomes, including have a greater percent of individuals engaged and supportive of reintroductions. If nothing else, having greater dialogue, based on facts and mutual between stakeholders and officials can lead to benefits for the Park’s future with management decisions or the environmental awareness of communities.

Public outreach, education and dialogue over management decisions within and outside the Adirondack State Park could achieve all of the requirements for a successful solution to
whether mountain lions could be reintroduced. Firstly, the outreach and following dialogue would certainly address the public’s involvement in management decisions and address the benefits of reintroduction. Secondly both the alternatives to reintroduction and the possible reintroduction of mountain lions could be weighed for the potential benefits for the environment within the Adirondacks. It is critical that the most appropriate management decision is implemented, and dialogue between stakeholders and officials can help create such solutions. Lastly, public education and outreach would satisfy the need for robust data, information and a balance between the needs of humans and nature. Focusing on robust data, including public opinions and factual mountain lion ecology and weighing the benefits from the perspective of concerned stakeholders would help guide future management decisions.

However, there are potential costs with public outreach and dialogue. If state officials alienate or antagonize select stakeholders, such as rural landowners or hunters, through their choice of words or a lack of respect, then mountain lion reintroduction will be far less likely or successful. Further, the time required for a successful public campaign to convince stakeholders about the benefits of mountain lions will take far longer than a survey. It is critical that officials respect the opinions of all individuals and have an open, respectful dialogue about management decisions that should ultimately be weighted by positive benefits and factual data, not just negative costs or misinformation.

**Third Solution: Deer Herd Population Viability**

Regardless of successful solutions with the willingness and support of communities for the reintroduction of mountain lions, it is critical that the ecological and environmental parameters necessary for a robust population exist or can easily be attained. Firstly, it is necessary to accurately gauge the herd size and viability of the deer population within and
bordering the Adirondack State Park. This study’s survey data, alongside other surveys from other studies, show that many rural communities and huntsmen believe that large carnivores negatively impact deer populations, including the ability for huntsmen to hunt for trophy bucks (Laundré et al. 2006). Furthermore, this study’s survey findings, as well as interviews with DEC officials and local ecologists present the following ideas: (1) the herd size within the Adirondacks is either too small or fragile (2) hunters believe that the deer population is too small for both successful hunting and the reintroduction of mountain lions to occur simultaneously and (3) the reintroduction of mountain lions may have a negative impact on the deer herd within the Adirondacks.6,7

Thus, it is critical to ascertain a true measurement of the viability of current the Adirondack deer population. Both an examination of the future deer population viability with current hunting pressures and the possibility of predation pressure from an introduced population of mountain lion should be conducted. By measuring the health of the deer population through population surveys, interviewing hunters, conducting extensive data collection of killed deer during hunting seasons, officials can begin to produce population parameters that can help produce population viability analysis, especially under situations where mountain lions are reintroduced. Although more future studies need to conducted, Laundré (2011) found that with varied mountain lion density (either 1 or 2 per 100 km², deer take per individual (30 or 40 deer per mountain lion annually), deer density (3.3 or 5.6 per km²) that the projected Adirondack deer population of approximately 56-66,000 deer would still produce more fawns per year than the maximum predicted predation rates of adults and calves by mountain lions. Simply, based on the most current information about the deer population within the Adirondacks and mountain lion

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6 Dr. John Laundré, Personal Communications, April 30 2014
7 Scott Van Arsdale, Personal Communication, May 1 2014
ecology, the Park can likely support a mountain lion population. However, one paper cannot justify the ecological necessity for reintroduction. More surveys and analysis must be completed before reintroduction can be determined ecologically feasible.

The determination of the current health of deer herds within the Adirondacks, as well as calculating the population viability of future herds within scenarios of mountain lion predation, is a solution that addresses the three parameters for a feasible solution. Foremost, determining the viability of the deer population will bring benefits regardless of mountain lion reintroduction. Firstly, stakeholders, primarily hunters, will benefit from greater participation in the management decisions made after deer data is collected, while also forging a more mutual, established relationship with environmental officials. Rather than having the DEC act as a regulator of deer licenses and kills, it would be far more beneficial for both parties if collaboration and mutual goals towards a managed, viable deer population became the established relationship. The DEC needs to not only “provide ‘hunting opportunities” to deer hunters, but to further “ecological management…and convince hunters that mountain lions are essential elements of the Park ecosystem.”

Although some deer hunters might resist the concept of the rights of mountain lions, we believe that collaboration with officials within deer management can reduce the possible frustration of hunters. Hunters may feel that possible mountain lion reintroduction schemes are being implemented without their concerns or input. This specific inclusion of hunters in determining the health of the Adirondack deer herd will enable proper management as well as impact the concept that many stakeholders have about the vitality and future of the herd.

Further, regardless of reintroduction, the environment will receive greater benefits from not only more concise, accurate data, but also the more informed management practices that

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8 Dr John Laundré, Personal Communication, April 30 2014
follow its analysis. Whether it be mountain lion reintroduction, alterations in the number of hunting licenses in the Park or other biocontrols that better manage core and peripheral deer herds, there are many potential ecological benefits that will cascade from a more managed deer population. Finally, the aims and results of this solution would be based on scientific facts that then weighed the costs and benefits of various means to control and manage the deer population. Further, the incorporation of both state officials and stakeholders in the success of determining the viability of the deer, even in situations where mountain lion reintroduction is not feasible, would insure that the appropriate management decisions had balanced input from the data and results of officials as well as the concerns of hunters and similar stakeholders.

There are greater costs with the implementation and success of determining whether current and future deer populations within the Adirondacks can support hunting and mountain lion predation. It will take several years of robust data collection from hundreds of hunters, many surveys as well as completing statistical analysis. The temporal and monetary costs are far greater than the initial solutions of public surveys and education. Further the implementation, and to a degree, the success of these steps will be dependent on the success of the earlier solutions. If hunters and other stakeholders are disinterested or feel alienated by state officials due to poor education and inclusion, than the steps to ascertain robust and accurate population parameters and viability analysis will fail or be incomplete. Officials must convince hunters that determining robust population analysis will benefit the prospects of future hunting seasons, regardless of mountain lion reintroduction. While the results from this solution will allow better management practices to be put in place in the Adirondacks and likely inform whether mountain lions can be reintroduced, the time/monetary costs and the greater need for stakeholder inclusion and participation make this a solution with potential for greater conflicts.
Fourth Solution: Devise Community-Based Conservation

A potential solution to the problems facing mountain lion reintroduction when it comes to public approval and the involvement of various stakeholders would be the creation of a management decision akin to community-based conservation. Although the management and enforcement of mountain lion reintroduction ultimately rests with state officials, it is imperative that community members have input and access to these decisions. Because of the mosaic of public and private land in the Adirondacks, as well as the multiple uses of the Adirondacks, whether for agriculture or recreation, it is critical that all stakeholders continue to benefit from the Adirondack ecosystem and landscape.

Thus, within the reintroduction of mountain lions, it is critical that communities are able to define not only the preservation of biodiversity in the Adirondacks, which the reintroduction attempts to do, but also the continued use of the Park and the socioeconomic benefits from reintroduction. By having the mountain lion reintroduction framed within the broader community of humans and the environment, where the benefits of reintroduction include economic and environmental contributions, reintroduction and the subsequent management of mountain lions can be successful. It is imperative that the scheme for community-based conservation regarding mountain lions considers and balances both the enhancement of wilderness and the economic incentives and benefits for the local communities.

Further, the type of regulation, whether self-regulated or co-managed strategies, is critical towards public involvement and the success of reintroduction scheme (Ruiz-Mallén and Corbera 2013). Although mountain lions should have federal protection and state enforcement initially, if the population became established and robust, more management decisions could shift towards
state and local communities. This would likely be beneficial; if the mountain lions brought about the expected economic and ecological benefits, than it would expected that local management would seek to protect the mountain lion for the extended future. A failure to have community input into management decisions could impact the success of reintroduction by (1) antagonizing or isolating stakeholders who feel no or little need to help conserve mountain lions (2) failing to address and establish the economic and ecological benefits derived from reintroduction and (3) failure to include stakeholders’ input in future management decisions.

An important component of establishing community-based conservation is the setting the precedent for future generations to enjoy and experience the wilderness of the Adirondacks. Community-based conservation can help establish a new environmental conscious within the communities of the Adirondacks. Not only are the economic and ecological benefits from this form of conservation, but also the culture. As Dr. Laundré claimed “it is our moral obligation to correct [the extinction of mountain lions]….no generation has the right to destroy native populations or ecosystems and deprive future generations of them.”

By establishing a new population of mountain lions in the Adirondacks, there would be many potential benefits. Further, reintroduction schemes based off community-based conservation could likely have positive economic and ecological benefits. By having management through state officials with large consideration of various stakeholders, which include stakeholders who have large concerns over mountain lion reintroduction, the reintroduction will likely be more successful. Not only will individuals have a personal responsibility to insure the continued conservation of mountain lions, but also individuals and the communities will benefit from the economic and ecological impacts of reintroduction. As Dr.

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9 Dr. John Laundré, Personal Communication, April 30 2014
John Laundré claimed “these animals are big attraction to tourists and millions of dollars are being made in areas where people go to see them…the mountain lion [attracts] around 300,000 people come to Big Bend National Park in Texas each year, many of them with the hopes of either seeing a mountain lion or at least it tracks.” Thus, from a community-based conservation perspective, the benefits for stakeholders can be quite large. Dr. Laundré soon-to-be-published data suggests that the economic benefits from reintroducing wolves and mountain lions into the Adirondack State Park could generate 250-300 million dollars annually in ecotourism annually, far greater than the ACR developed in Tupper Lake.\textsuperscript{10}

Simultaneous ecological benefits can be derived community-based conservation. Adirondack communities who are engaged with the management of the surrounding land and resources, including mountain lions, while also receiving large economic benefits, will be far likely to conserve and appreciate the environment. Because of the socioeconomic benefits, management decisions will likely continue to preserve biodiversity and protect land.

However, there are potential costs for community-based conservation. Firstly, it will take a relatively long time and abundant resources to establish a well-integrated system of co-shared management between communities and officials. Trust and relationships will have to be built and the success of the management is truly dependent on the success of earlier attempts at outreach and public education.

Secondly, the ecological impacts from a community-based conservation that aims to promote and financially benefit from mountain lion reintroduction are unknown. What would the ecological impact be on protected areas if 300,000 more visitors came to the Adirondacks? Would the potential damage outweigh the likely economic gains? Because of the time

\textsuperscript{10} Dr. John Laundré, Personal Communications, April 30 2014
considerations, the dependency on earlier, more solvable solutions concerning public outreach and the potential ecological consequences from new ecotourism, community-based conservation is deemed a less positive solution for mountain lion reintroduction. This is not to condemn the attempts for community-based conservation, or its necessity for successful mountain lion reintroduction. Primarily, this solution is more negative than earlier solutions because it is dependent on variables absent within the current communities as well as the potential ecotourism complications that might actually hurt the health and benefits of the environment.

**Fifth Solution: Network and Connectivity of Private and Public Lands**

It is imperative that appropriate sites for reintroduction are found and located before mountain lions are reintroduced. Laundré (2011) argued that sites in the Adirondacks with 500+ meter buffers from human development would be appropriate for mountain lion reintroduction. Further, reintroduction in large areas of public land in the western areas of the Adirondacks could help mountain lions acclimate to the area without potential road fatalities or high incidents of human encounters (Laundré 2011, Van Dyke 1986). However, not all the specific ecosystems within the Adirondacks are suitable for mountain lions, whether it is the composition of the forest or the density of deer (Laundré 2011, Hurst and Potter 2007). Thus, there must be a concentrated effort before reintroduction to determine the appropriate sites for reintroduction for mountain lions. Much of the data necessary for determining sites will be the result of the collected deer census data, as well as management decisions formed by community-based conservation and state officials.

However, more must be done. As Laundré (2011) expanded, although the suitable habitat for mountain lions exceeds 20,000 km² within the Adirondack State Park, the connectivity of
these habitats is poor. The network between these ‘patches’ with suitable habitat, that have state
protection and management and proper deer herd sizes to benefit the mountain lion must be
strengthened. As Appendix B shows, roads and human settlements often break up the
connectivity between suitable sites. The concerns of early conflict with humans, road fatalities
and the large ranges of mountain lions make it absolutely necessary for the network between
these ‘patches of suitable habitat’ to be strengthened and protected (Laundré 2011).

New conservation easements on currently unprotected private land and new management
strategies on conservation easements are critical to help create corridors between the large
regions of undeveloped land that are suitable for mountain lions. As the DEC explains,
“conservation easements primarily [exist] on properties that buffer existing state lands, provide
additional public recreational opportunities, and/or maintain large working forests” and that “the
primary function of an easement is to limit or eliminate future development and undesirable land
uses on a property, while allowing for continued private ownership and traditional management”
(Conservation Easements 2014). The management strategies on existing and future land
easements would be beneficial, as long as mountain lion conservation was at the apex of the
management strategies.

Because existing land easements are unique in terms of their management strategies, state
officials would have to work with landowners to incorporate strategies that dealt exclusively
with mountain lions. Parameters such as protecting biodiversity, prohibiting poaching or killing
of mountain lions and preventing development on the land could all be feasible strategies that
would insure land easements could act as appropriate corridors for transient mountain lions.
Similar measures would have to be at the forefront of future easement creation and management
strategies. Within all of these managements, some form of payment might be necessary to help
convince landowners to protect mountain lions within easements. Payments for lost livestock or pets or simply an additional cost to help quell the fears of some landowners might be necessary and certainly acceptable within certain circumstance. Hopefully however, state officials will be able to respectfully approach, listen and educate the easement managers about mountain lions and their potential benefits. Hopefully, the result of this strategy would be the creation of new and pre-existing conservation easements that had mountain lion protection at the forefront of their management.

The development of pro-mountain lion conservation easements will benefit both the stakeholders and the environment. Firstly, payments by state officials and inclusion in management decisions will both benefit the various stakeholders throughout the Adirondacks. Further stakeholder benefits will likely be derived from the protected, undeveloped land, whether it is ecosystem services or the potential benefits from mountain lion reintroduction. Further, the greater restrictions on development and the greater extent of protected land will not only aid mountain lion reintroduction, but other various creatures that depend on corridor movements. By stopping development of private land and increasing managed protection, stakeholders and the environment will both receive large benefits.

The systematic approach that would be required for conservation easements would require lengthy time and money. Its success would also be determinate on whether measures such as community-based conservation and public education were successful in treating the mountain lion as resource within the Park that needed conservation and protection. While community-based conservation and lead easement protection should go hand-in-hand, the diversity of existing easement management plans and their size will complicate the solution. Further, the practicality of creating new land easements in aiding creating corridors for mountain
lions will require more time, planning and money. Officials will be required to think on many
different spatial scales; considering how easements will effect conservation within the Park,
regions of the Park and specifically within that easement will require meticulous planning.
Although the success of creating conservation easements to aid mountain lion conservation and
movements will certainly make reintroduction efforts more feasible, the plan will require the
most amounts of time and money, as well as immense planning.

Identification of Feasible Solutions

Unless rapid community response and demand for mountain lion reintroduction occurs
(which is very unlikely based on the study’s own survey data), it is likely that the most feasible
solutions will comprise of both education outreach by state officials and the population viability
analysis of the deer population. There are several reasons why these two solutions are the most
feasible. Firstly, independent of mountain lion reintroduction, we believe that the future of the
Adirondack State Park should include more environmental awareness and education, as well as
cooperation between stakeholders and officials when determining management decisions.
Whether or not communities publically welcome mountain lions, we believe that stakeholder
involvement and participation in management of the Adirondack State Park will help create a
new culture of environmental awareness and though. Secondly, the costs of these two solutions
are relatively low. While both of these solutions will take time, whether it is a multi-year
campaign promoting education about mountain lions, or taking deer census, the costs of these
two projects will likely still both be rather low. Hence, the potential benefits from these solutions
will exceed the monetary and temporal costs.
We believe that community-based conservation towards mountain lions as means to bolster the Adirondack regional ecology and economy is a feasible solution. However, it is unlikely that this solution will be feasible if earlier solutions that try to educate and increase involvement between stakeholders and officials fail. Further, the associated temporal costs for helping devise co-managed conservations schemes will take time, especially if some stakeholders are still resistant. Although we don’t currently have a pressing need for the immediate reintroduction of mountain lions, it is appropriate that solutions and management decisions are made. Additionally, the potential costs from expanding ecotourism, as well as the costs to manage mountain lion reintroduction need to be within the calculations of how feasible community-based conservation can be within the Adirondacks.

Finally, the ability to create and modify conservation easements with the goal of creating additional protected environments for mountain lions, specifically between large regions of state protected land, is the least feasible. The reasons for reduced feasibility for the land easements are both the diverse management nature of individual easements, the ability to plan and develop corridors though land easements and the probability that some individual stakeholders will not accept mountain lion protection. Further, the time and monetary costs for the solution will likely exceed the previous solutions’ costs. Although the benefits of creating corridors will have extensive benefits for the management and conservation of mountain lions, as well as likely other ecological parameters, the costs associated with the solution make it less likely than aforementioned solutions.

Identification of Best Solutions

The most important, or most necessary solutions are those that will not only protect biodiversity within the Adirondack State Park, but also insure that the future of the Park may
expand protection and conservation measures, including mountain lions. Additionally, the best solutions will maximize the benefits of stakeholders throughout the community, including their inclusion within management decisions and their ability to benefit from the protected, conserved ecosystems within the Park. It is critical that the inclusion and participation of stakeholders be at the forefront of any management decisions concerning mountain lion reintroduction. An engaged community that understands management decision will likely be far more supportive of later decisions which will impact mountain lion reintroduction. Although the best solutions may allow feasible reintroduction of mountains lions, independently they should also satisfy the parameters mentioned in the previous sections.

The two best solutions that will likely maximize the potential successes towards a mountain lion reintroduction as well as the environmental vitality of the Adirondacks will be public education campaigns by state officials as well as beginning to include stakeholders in management decisions, specifically determining the current and future viability of the Adirondack deer herd. These two solutions will not only satisfy parameters of increasing the potential benefits for both stakeholders and the environment, but their associated costs will be far exceeded by the benefits of successful implementation. Regardless of the later determination towards the feasibility of mountain lion reintroduction, public education and outreach as well as better comprehension and management of the Adirondack deer herd will benefit the region in the future.
EASE OF IMPLEMENTATION

In regards to the feasible solutions for reintroducing mountain lions into the Adirondack State Park, implementation and success of the initial public outreach solutions is quite dependent on several factors regarding stakeholder interests and the tone set by state officials. We realize that even the most professional and well-intended public campaigns can be perceived by individuals as either arrogant or overreach by government officials. Further, although the outreach is intended to include stakeholders in management decisions as well as the future management of mountain lions through community-based ecology, that not all individuals will recognize the benefits from mountain lions. Although the outreach intends to build consensus among stakeholders, the immediate perception of fear from reintroducing a predator might override the potential benefits of a managed ecosystem and coinciding economic benefits.

The culture of the Adirondacks, especially rural and agricultural communities, may inhibit the willingness of stakeholders to accept change. Many hunters and farmers have been raised in an environment where predators, including mountain lions, were a feared, but absent myth. The sudden introduction of mountain lions by environmental officials may be perceived as an abrupt challenge to the engrained ‘traditional’ way of life. Although the plans for management decisions, including education, outreach and community-based conservation, attempt to include and respect all stakeholders and their concerns, opposition to mountain lion reintroduction might occur. Although the solution scheme attempts to build consensus for the reintroduction of mountain lions is built upon the benefits and the potential positive economic/ecological outcomes, fear may still create stakeholders to form opposition to the plans.
The education outreach is likely to be least expensive solution and should help determine the fate of the subsequent future. Hence, if public support from a broad group of stakeholders is great enough to prompt officials to truly consider reintroduction, than more expensive and time intensive solutions such as population viability analysis of deer populations or constructing community-based conservation management can then begin. Rather than examining mountain lion reintroduction as a problem that has a series of solutions, the ultimate solution, whether or not reintroduction can occur, is dependent on a series of solutions and whether or not each solution is viable. Thus, if officials conclude at the end of education outreach that public support doesn’t warrant reintroduction, than further solutions should not occur.

Similarly, we expect that conservation easements and public land could be protected, networked and managed in a way that included the protection of mountain lions. Within these parameters, the success of community-based conservation and the willingness of private landholders to participate in post-reintroduction management and conservation are very dependent on the success of earlier education and outreach by officials. It is likely that some individuals will resent the reintroduction of catamounts and will value the potential costs of mountain lions (risks of depredation, fatalities and fear) above the potential benefits of the mountain lion reintroduction. However, opposition in the later implementation of land conservation and community conservation is unlikely if earlier attempts to build consensus within communities and stakeholders is successful.

While the ecological necessity for and ability to cope with mountain lion reintroduction is greatly dependent on factors beyond the control of humans, such as the vitality of deer herds, we believe that current projections make reintroduction a seemingly viable option. The current data on suitable habitat, protected areas for reintroduction and the future of the Adirondack deer herd
make reintroduction not only a feasible plan, but also a necessary management decision. However, before reintroduction occurs, it is critical that stock of the ecological health and the landscape of the Adirondack State Park are measured and analyzed first.

Further, the potential complications from transient, individual mountain lions migrating to the Adirondack State Park have implications towards the health and wellbeing of the species (Pierce et al. 1999). As we stated before, is to help manage wildlife that benefits not only humans, but also the ecosystems and species within the Park. Reintroduction would insure a genetically viable population was established in the Park and could have immediate ecological and economic impacts, many of which are benefits, not costs. Genetic bottlenecking, inability to reproduce and the morality of condemning individual mountain lions to live and die in isolation make it imperative, from an ecological perspective, for reintroduction to occur. As Dr. John Laundré said “they want to get here but just can’t get on their own.”11

11 Dr. John Laundré, Personal Communications, April 30 2014
IMPLEMENTATION PLAN

Systematic survey of Adirondacks and Surrounding Communities:

A systematic survey of the Adirondack region will need to be the first completed step before any extensive public campaign for reintroduction begins. A preliminary poll will give state officials and organizations the necessary information for the subsequent education outreach. Surveying will inform officials about (1) which concerns over mountain lions are the most severe and the most prevalent (2) which areas express the least willingness to support mountain lion reintroduction and express the most concerns about the species and (3) have individuals address other environmental conditions or problems within the Park that may be dependent or independent of any potential mountain lion solution.

State environmental officials, both the APA and the DEC, will conduct the survey. These officials will likely have the authority in management decisions concerning the mountain lions as well as leading public education and discourse regarding mountain lions. The survey should attempt to garner information and opinions from the main identified stakeholders. Special consideration should focus on stakeholders who have economic stake with the possible reintroduction as well as those who are the most likely to have direct contact with mountain lions. By selecting rural addresses throughout the hamlets and towns of the Adirondack State Park, officials will benefit by identifying the concerns of stakeholders who will likely be the most ardently opposed to the reintroduction (Nilsen et al. 2007, Pate et al. 1996).

The survey should include space for basic facts about mountain lions as well as space for comments and questions towards environmental officials. By giving space for stakeholders to respond and question officials about reintroduction, the initial stages of reintroduction will have a greater integration of state officials and community members in decision-making.
It is important that surveys not frame mountain lion reintroduction within a narrow problem, but rather encompasses and expands towards the future ecological and human needs of the Park. The results of surveys will help the effectiveness of the public outreach by the DEC and other environmental organizations. 12, 13 These first steps will insure management of the Park will not be solely top-down from officials, but will also incorporate and respond to public opinions or concerns. This is especially true when mountain lions are reintroduced.

**Public outreach and Education Campaign:**

An intensive public discourse and education campaign, focusing on mountain lion reintroduction, will follow the collection and analysis of survey data. The campaign must only initiate after the key issues and concerns of the majority of stakeholders are identified. It is imperative that the addressed issues match the stakeholders’ needs and concerns; education and outreach should focus on livestock loss if that is the primary concern of regions with intensive agriculture. The education process should be adaptive to the concerns of the public and further focus on building connections rather than burning ties between community groups and various stakeholders.

The public education and discourse between stakeholders should initiate as public meetings akin to town meetings. Public officials should present information regarding the mountain lion and then address the concerns of the community. Further success with education measures will be achieved individual stakeholders questioning public officials. The goals of the public outreach should not be lectures or scolding, but rather an attempt to find common ground, express concerns and provide facts and data. If the discourse over reintroduction can remain

12 IRB Survey by Self and McIvor 2014
13 Scott Van Arsdale, personal communication, May 1 2014
engaging and respectful, the appropriate management decisions concerning mountain lion reintroduction will occur.

Outreach by public officials, as well as inclusion in management decisions, should focus on two stakeholder groups who have traditionally had the greatest reservations towards large predator reintroduction. Firstly, rural communities should be made aware of the potential benefits of mountain lion reintroduction. Often these communities, especially ones with prevalent agriculture, largely express negative opinions towards large carnivores, primarily towards livestock loss and human harm (Nilsen et al. 2007).

The close proximity of rural hamlets to where mountain lion reintroduction will likely occur means future conflict is likely to occur. While fenced regions or human resettlements would limit contact between mountain lions and humans, both options are neither desirable nor cost-effective and would detract from the wilderness-developed mosaic of the Adirondacks. Instead, focused outreach from the DEC and APA must highlight the benefits from mountain lion reintroduction while also quelling concerns about the mountain lions. By discussing the economic benefits from mountain lion reintroduction, such as reduced costs from unmanaged deer populations and the reduced need for unpopular, often condemned, bio controls such as culling and contraceptives (Nilsen et al. 2007) as well as reduced crop loss and destruction, mountain lion reintroduction can become a positive decision and not a negative.

Officials also must approach hunters and outdoorsmen through educational outreach and inclusion in management decisions. Without infringing on the beliefs of the hunters, who many believe any apex predator is bad for sport hunting (Laundré et al. 2006), the DEC and APA must outline the potential economic and population benefits from reintroducing mountain lions. Mountain lions and other apex predators can help result in larger returns on trophy stags (less
competition for resources) and a vast reduction in humans contracting Lyme disease (Nilsen et al. 2007). By associating mountain lion reintroduction with positive outcomes, especially the quality of the deer herd, it is more likely that hunters will be engaged and supportive of the measure. Despite claims by huntsmen, unpredictable and harsh winters, not increased mountain lion predation was the catalyst behind decreased mule deer yields in western states (Debate Over Deer 2011, Laundré et al. 2006). Further hunters must be made aware that mountain lions primarily target weak deer or fawns, which actually help increase the vitality of herds and individuals (Laundré et al. 2007, Nilsen et al. 2007).

Ecosystem Analysis and Forming Community-Based Conservation:

After public outreach has concluded and been deemed successful (final surveys of individuals and stakeholders), it is important that the next steps help facilitate the feasibility of mountain lion reintroduction. This will be accomplished through the cooperation of stakeholders and state and federal officials. The primary charge of this project will be to assess the Adirondack State Park for the whether the ecosystem can support the reintroduction of mountain lions. Based off the existing literature and facts, both the habitat size and type as well as the density of deer within the Park suggests that mountain lions can be reintroduced (Laundré 2011). But more should be done.

It will be imperative that local officials and stakeholders create an environment suitable for mountain lion reintroduction, as well as an environment where benefits of the reintroduction can be distrusted throughout the communities. Firstly, officials and stakeholders should survey and determine the environmental parameters necessary for reintroduction. Primarily these should include habitat availability and deer population viability surveys. Afterwards, management and conservation strategies should be developed that base control between state officials and
stakeholders, including the creation of new land easements that conserve land for mountain lion habitat and movements. The state should have the primary charge of enforcing the initial management of reintroduced mountain lions as well as pay for the costs of reintroduction, which will include expanding conservation easements, possible livestock depredation and continuing to survey and evaluate environmental parameters throughout the entire reintroduction.

**Reintroduction and Management of Mountain Lions**

Reintroduction, currently, appears to be an ecologically viable management decision within the Adirondack State Park. However, based on surveys, many stakeholders are worried, concerned and even opposed to reintroduction. It is imperative that both the environmental conditions within the Park necessitate and the human communities of Park accept, support and are included in the reintroduction of mountain lions. Officials cannot blindly reintroduce mountain lions without consulting, educating and including stakeholders in management decisions nor ignore the current and future environmental conditions within the Park. Success of reintroduction is dependent on these two factors.

As we have argued, reintroduction is a necessary management decision due to the likely ecological and economic benefits from restoring the Adirondack State Park to a region of greater wilderness. There are ecological reasons for reintroduction, including the genetic viability of a population composed of either managed, released individuals or random, transient individuals who migrate from western North America. Further, it appears that the stability and growth of future deer populations within and bordering the Park necessitate management other than hunting and certainly not other intensive biocontrols such as culling.
State and federal officials will have to take charge of the reintroduction of individuals. In terms of the number and relatedness of individuals, Dr. John Laundré believes that “20-30 animals be adequate to get the population started…. [and] if necessary… additional releases…” and that the sex ratio should be “4 to 1 (female to male)… as it what [is] seen in nature.” Further Laundré believes that the 3-4 females released within the territory of the male should be related and that potentially releasing pregnant females will reduce the desire for females to travel extensively.¹⁴ More research will need to be done on the parameters of the Park as well as where individual mountain lions will be taken from for reintroduction before facts such as individuals released, frequency of reintroduction and the areas of reintroduction can be determined (Jule et al. 2008).

After reintroduction, it is critical the aims and goals of management be adaptive to the ecological and environmental impacts of mountain lions, as well as the vitality of the mountain lion population itself. Management should not aim towards one specific goal for an indefinite period of time, but rather, incorporate current data, impacts and stakeholder opinions to evaluate current goals and create new ones (Runge 2013). This may include determining the protected state of mountain lions; if mountain lion populations grow to rapidly or expand into heavily urban areas beyond the Park, than trophy hunting may be a potential avenue to help manage the population, akin to methods used in western states (Cullens et al. 2012). Adaptive management should extend beyond the population of the mountain lions. The population viability of deer, community-based conservation goals as well as other environmental conditions directly impacted by mountain lions should receive attention in terms of monitoring and evaluating the impact after reintroduction. As we discussed earlier, the DEC has failed throughout the state to often combat

¹⁴ Dr. John Laundré, Personal Communications, April 30 2014
to the increasing populations of deer herds through conventional methods such as hunting. Adaptive management will allow officials and stakeholders to co-manage the Park and the mountain lion population by constantly evaluating measures of success and problems. Mountain lions should not be released into the Park and then be left to live their lives. Proper and successful management will include keeping tabs on the vitality and impact of the species and adapting management to reflect the dynamic, wild nature of the Park.

CONCLUSIONS

The debate over the reintroduction of mountain lions raises many questions over the Adirondack State Park’s unique private-public landscape, the role of community members and stakeholders in environmental management decisions, and ultimately the future of the Park. Our extensive survey of the citizens throughout and bordering the Park as well as interviews with professionals shows that there are obstacles to a feasible reintroduction, mostly the concerns and lack of participation of potential stakeholders. Further there is a great need to analyze the ecosystems within the Park, especially corridor connectivity between large protected areas and the future viability of the deer herds within the Park. Our implementation plan and set of solutions, we believe, can achieve an environment suitable for the establishment and protection of a viable mountain lion population. Afterwards, adaptability and community-based conservation are critical to keep the balance between nature and humans within the Park in sync as well as appropriate for the survival of the mountain lion.
ACKNOWLEDGEMENTS

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LITERATURE CITED


Images

Figure 1. Photo courtesy of Susan Willson, Canton, NY.

Figure 2. Raccoon Tail Image. http://photography-vlm.blogspot.com/2013/05/raccoon-antics-1.html

Interviewed Informants

Laundré, J (2014) Personal communication, (April 30)

Van Arsdale, S (2014) Personal Communication, (May 1)

Willson, S (2014), Personal Communications
APPENDICES

Appendix A. Copy of Survey Instrument

Mountain Lion Survey

You are being asked to participate in a survey research project entitled “The Proposed Reintroduction of Catamounts into the Adirondack State Park,” which is being conducted by Abbie McIvor, Ethan Self and Dr. Erika Barthelmess at St. Lawrence University. This survey is anonymous. No one, including the researchers, will be able to associate your responses with your identity. Your participation is voluntary. You may choose not to take the survey, to stop responding at any time, or to skip any questions that you do not want to answer. You must be at least 18 years of age to participate in this study. Your completion of the survey serves as your voluntary agreement to participate in this research project and your certification that you are 18 or older. Questions regarding the purpose or procedures of the research should be directed to Ethan Self at eoself10@stlawu.edu, Abbie McIvor at ammciv10@stlawu.edu or Dr. Erika Barthelmess at barthelmess@stlawu.edu.

Please note that you may choose whether or not participate in this survey at all or leave any questions unanswered if you so choose. Your answers are used to gauge your personal opinions surrounding the catamount (mountain lion) and related topics, all answers will be kept confidential. No raw data from these surveys will be shared at any time. No one under 18 years old may complete this study. If you do choose to participate in the survey please place it in the included addressed envelope. If you wish to be included in a drawing for a $50 Visa gift card please fill out the included card with your contact information. Once the drawing is completed all contact information will be destroyed and will not be shared with anyone at anytime. Please return completed survey in the pre-marked envelope three days after receiving it. If you wish to view the results of our case study please visit http://stlawu.edu/conservation-biology/conservation-biology-case-study-archive

Thank you so much for your participation!

1.) Do you believe currently there are mountain lions in your area?  YES  NO

2.) If “yes,” why? -

3.) Should New York State officials consider reintroducing mountain lions in Adirondack State Park?  YES  NO
4.) If you think mountain lions should be reintroduced into the Adirondack State Park, would you be willing to pay a tax in order to facilitate the reintroduction? **YES NO**

5.) If yes, how much per year? _______________________________________

6.) How worried would you be about mountain lions in your area (choose one that applies)?

   1  2  3  4  5
   Not worried    I’m neutral    Very worried

7.) How concerned are you about the threat posed by mountain lions to domestic animals or livestock?

   1  2  3  4  5
   Not worried    I’m neutral    Very worried

8.) Have you ever hunted deer the Adirondack/St. Lawrence Valley area? **YES NO**

9.) There are too many deer in my area (circle your response)

   Strongly disagree    Disagree    No opinion    Agree    Strongly agree

10.) Reintroduction of mountain lions in the state park would change my experience in the Adirondack Park.

   Strongly disagree    Disagree    No opinion    Agree    Strongly agree

11.) I would spend more time in the Adirondack Park if mountain lions were present.

   Strongly disagree    Disagree    No opinion    Agree    Strongly agree

12.) I would feel less comfortable in the backcountry of the Adirondack State Park if mountain lions were present.

   Strongly disagree    Disagree    No opinion    Agree    Strongly agree
13.) I think more people would visit the Park if mountain lions were present.

Strongly disagree  Disagree  No opinion  Agree  Strongly agree

14.) I believe that humans have a responsibility to manage ecosystems and to promote balance in nature.

Strongly disagree  Disagree  No opinion  Agree  Strongly agree

15.) New York State should focus more of its resources into promoting healthy, accessible environments and protecting wildlife.

Strongly disagree  Disagree  No opinion  Agree  Strongly agree

16.) We are approaching the limit of the number of people the earth can support.

Strongly disagree  Disagree  No opinion  Agree  Strongly agree

17.) Humans have the right to modify the natural environment to suit their needs.

Strongly disagree  Disagree  No opinion  Agree  Strongly agree

18.) When humans interfere with nature it often produces disastrous consequences.

Strongly disagree  Disagree  No opinion  Agree  Strongly agree

19.) Human ingenuity will insure that we do NOT make the earth unlivable.

Strongly disagree  Disagree  No opinion  Agree  Strongly agree

20.) Humans are severely abusing the environment.

Strongly disagree  Disagree  No opinion  Agree  Strongly agree

21.) The earth has plenty of natural resources if we just learn how to develop them.

Strongly disagree  Disagree  No opinion  Agree  Strongly agree

22.) Plants and animals have as much right as humans to exist

Strongly disagree  Disagree  No opinion  Agree  Strongly agree

23.) The balance of nature is strong enough to cope with the impacts of modern industrial nations.

Strongly disagree  Disagree  No opinion  Agree  Strongly agree
24.) Despite our special abilities humans are still subject to the laws of nature.

   Strongly disagree   Disagree   No opinion   Agree   Strongly agree

25.) The so-called ‘ecological crisis’ facing humankind has been greatly exaggerated.

   Strongly disagree   Disagree   No opinion   Agree   Strongly agree

26.) The earth is like a spaceship with very limited room and resources.

   Strongly disagree   Disagree   No opinion   Agree   Strongly agree

27.) Humans were meant to rule over the rest of nature.

   Strongly disagree   Disagree   No opinion   Agree   Strongly agree

28.) The balance of nature is very delicate and easily upset.

   Strongly disagree   Disagree   No opinion   Agree   Strongly agree

29.) Humans will eventually learn enough about how nature works to be able to control it.

   Strongly disagree   Disagree   No opinion   Agree   Strongly agree

30.) If things continue on their preset course, we will soon experience a major ecological catastrophe.

   Strongly disagree   Disagree   No opinion   Agree   Strongly agree

14.) Gender:  

   MALE   FEMALE   PREFER NOT TO DISCLOSE

15.) Age:___________________

16.) Highest level of education completed: ______________________________

17.) Profession: ___________________________________________

18.) Town of Residence: ____________________________________________________

THANK YOU
(With your signature we cannot absolutely guarantee your confidentiality. However, we will use upmost care and preventive measures to maintain your confidentiality after you return this survey)
Appendix B: Land Use of Adirondack State Park and Mountain Lion Implications

Figure 1: Map of Adirondack State Park that illustrates the fragmentation of suitable land for mountain lions based on the following: (a) state versus public land (b) fragmentation of habitats due to roads and highways (c) land unsuitable due to human settlements and (d) habitat quality based on suitability based on mountain lion ecology. (Figure credit Laundré 2011).