

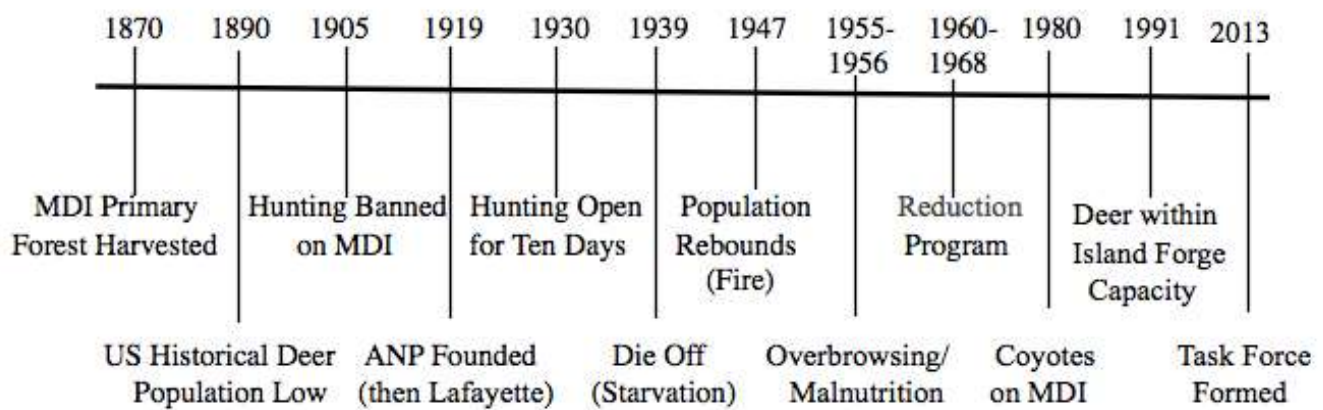
A History of Deer Management on the Island of Mount Desert, Maine.

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Timeline of Deer-Human Interactions on MDI 1870-2013



Introduction

As long as humans have inhabited Mount Desert Island there have been white-tailed deer (*Odocoileus virginianus*). Archaeological evidence has revealed that deer were present on or in the vicinity of Mount Desert Island (MDI) prior to the arrival of Europeans in North America (Stitt 1965). Both deer and humans have had to adapt to each other throughout history, though the deer have had to adapt to a landscape radically altered by humans. A lot about MDI has changed in the past 150 years: by 1870, decades after people began coming to the island in earnest, most of the island's first-growth forest was gone (Sterba 2012). Those who settled Mount Desert Island created a landscape of small farms and industries much like the rest of New England. 47% of the Island's acreage was classified as "improved" in government records, meaning it had been put to human use and not left as forest (Sterba 2012). In many ways, this creation of a landscape of "edges" (transition zones between different landscape features) was the beginning of a long history of human-deer interaction, as the "improvements" humans made to the land created ideal habitat for deer.

As Jim Sterba (2012) put it, "by the beginning of the twentieth century, the island was about as 'tame' as it could be." Bar Harbor was becoming a town of mansions, and gasoline-powered portable sawmills were moving into the harder-to-reach parts of the island to harvest the remaining forests. By the time Lafayette National Park – later to become Acadia National Park – was founded in 1919, the regions of the island that were

flat enough to farm had been cleared for pasture, hay, and crops. The island was a network of family farms and homesteads surrounded by mountains: a landscape perfect for a bountiful deer herd to thrive.

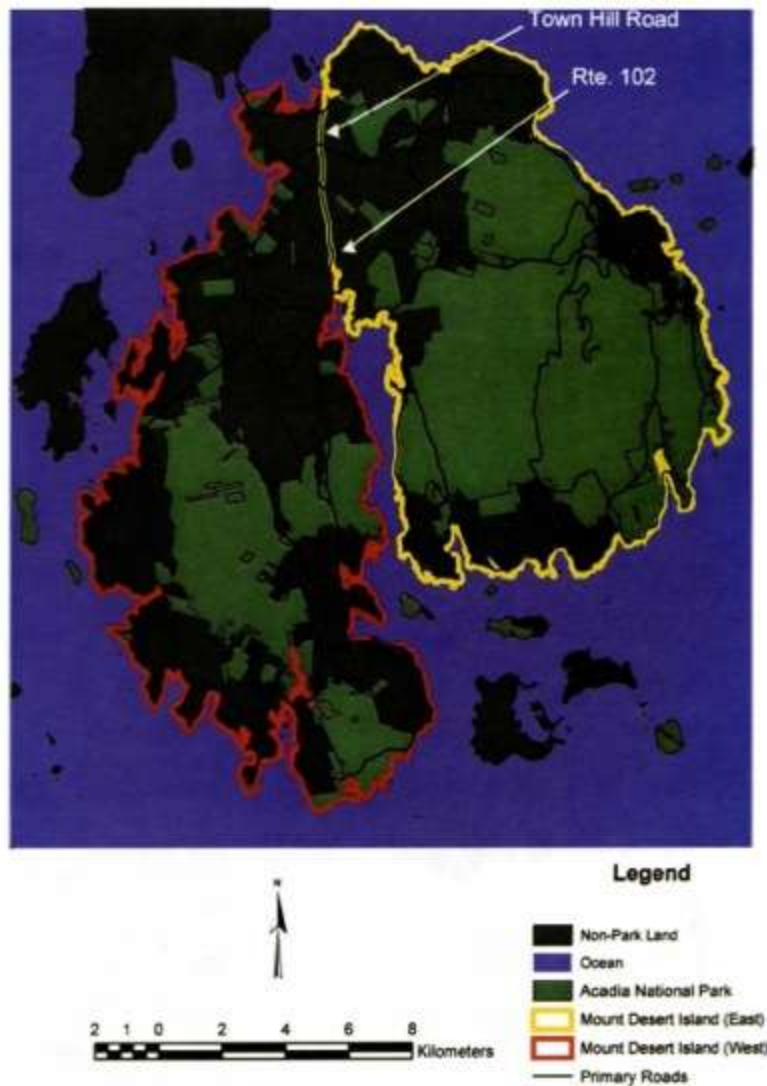


Figure 1: Mount Desert Island - Park and non-park lands are major roads (Fuller and Harrison 2003).

However, at Acadia's founding, deer were not nearly as abundant as they are today. In fact, white-tailed deer reached a historic low nationwide in 1890, with an estimated 350,000 animals in isolated pockets around the country (Sterba 2012). Conservation

efforts in the beginning of the 1900s allowed deer populations to start recovering. Deer began appearing in suburbs and small towns – places they hadn't been seen before – in the 1970s. Between 1980 and 2000, populations around the country doubled and tripled. One hundred years after their historic low in 1890, there were an estimated 25-40 million white-tailed deer nationwide (Sterba 2012). Deer had become ubiquitous in rural and suburban landscapes, including Mount Desert Island.

Park officials in Acadia have said on numerous occasions over the past decades that the deer are existing within the park's carrying capacity (Connery and Wheeler 2014). However, human-deer conflicts are now on the rise: deer collisions, crop damage, and the threat of transmission of Lyme's Disease have pushed the Town of Bar Harbor to establish a Deer Herd Control Task Force. With the deer on MDI reaching their *social* carrying capacity, a review of the history of deer management on the island would be prudent before the Town moves forward.

1900-1947: The Early Years

There are no credible accounts of how numerous deer were on Mount Desert Island prior to 1900 (Stitt 1965). However, as deer became more and more abundant on the island throughout the 20th century, tensions arose between those who wished to hunt and actively manage them, and those who wished to leave them alone. Deer hunting on MDI was officially banned in 1905 (Stamey 1969; Johnson 1938). The first legislative record of the ban we could find was in 1917 in an act passed by the State Legislature titled "An Act to Revise, Collate, Arrange, and Simplify the Inland Fish and Game Laws of the State both

General and Public and Private and Special, and the Rules and Regulations of the Commissioners of Inland Fisheries and Game now in Force.” The Act declared that “no deer shall be pursued or killed at any time” on the Island of Mount Desert or in Hancock county as a whole (Bar Harbor Times, 4/14/1917).

The population reportedly remained small between the turn of the century and 1920 (Stitt 1965). From 1920 to 1939 there was a general increase in the deer’s numbers. Curiously, a few records reference a ten day opening for hunting in 1930, though neither specify the reason for it (Johnson 1938; Stitt 1965).

In 1938, a “Special Report on Deer and Deer Browsing” was published by Maynard S. Johnson, Acadia’s Associate Wildlife Technician. This was the first significant citation of poaching on the Island since the 1905 ban of hunting: “Park Ranger Thompson and Game Warden Smith believe there has been twice as much poaching on Mount Desert Island in the past year as in any previous year in their memory.” Johnson attributed the increase in poaching to the small ranger and warden force, the easily accessible deer herds, residents’ desire for a free supply of meat, few convictions, and a widespread belief that deer were in such numbers that poaching was not a harmful practice. He reported that poaching was equally prevalent within and outside of the Park, and that illegal shooting on the island increased substantially during the legal hunting season on the mainland. And while park officials estimated there were 500-600 animals in that year, residents believed there were literally “thousands” on the island. Johnson even described that a considerable number of deer were shot from passing automobiles and that many of these animals were left by the road and later discovered by a ranger or warden (Johnson 1938). While there

had never been an official deer management program on the island or in the Park up until that point, it is clear that the conflict of interests between park managers and local residents is not a new occurrence.



Figure 2: "Closely browsed sprouts from Amelanchier stump...roadside chopping near north end of Great Pond. January 28, 1938" (Johnson 1938).

Later in his report, Johnson (1938) made some very astute observations about the predicament of deer on MDI, so much so that they are near-premonitions of the following decades on the island:

Though it is probably true that on most parts of the island available deer food is not now being decreased by demands made upon it, it seems wholly probable that any appreciable further increase in number of deer, and consequently increased intensity of browsing, would lead to a decrease in available food through inability of new sprouts and seedlings to get a start. Once the balance is turned in this direction the trend is an accelerating one, which can then be reversed only by drastic reduction in number of deer – through starvation or shooting....It is recommended that the National Park Service seek cooperation of State Fish and Game Department to establish legal deer hunting on certain parts of Mount Desert Island outside Acadia National Park as a means to avoid an emergency which might shortly necessitate hunting within the Park.

Following Johnson's report, there was an intense die off in the spring of 1939, supposedly because of starvation (Stitt 1965). For the next decade or so there was a significant decline in the deer population. This was due to fewer and less-palatable browse as the forests of Acadia matured towards a conifer-dominated composition, deer moving out of the park where lumbering and other land-clearing uses created better browse, an increase in poaching, and increased mortality due to domestic dog predation and automobile collisions (Stitt 1965). It was not until the fire of 1947 that Mount Desert Island's deer population had the opportunity to rebound.

1947-1960: Deer Population Boom

The 1947 fire, a catastrophe that has literally been burned into the memory of the Park and the island's inhabitants, incinerated approximately 10,800 acres to the east of Somes Sound (Stitt 1965). This allowed for massive alterations in the landscape and its vegetation types, including an increase in pioneer species of deciduous trees that deer are partial to. Large predators had long since been extirpated, and coyotes were only first documented on the island in the 1980s (Winter 1990). The protection the Park afforded to the deer – the 'no hunting' clause of the Park Service's 1916 Organic Act – together with an anti-hunting sentiment held by the majority of island inhabitants kept deer safe from hunting within and outside of the Park. With an abundant food supply, no predators, and no hunting pressure, MDI's deer populations boomed.

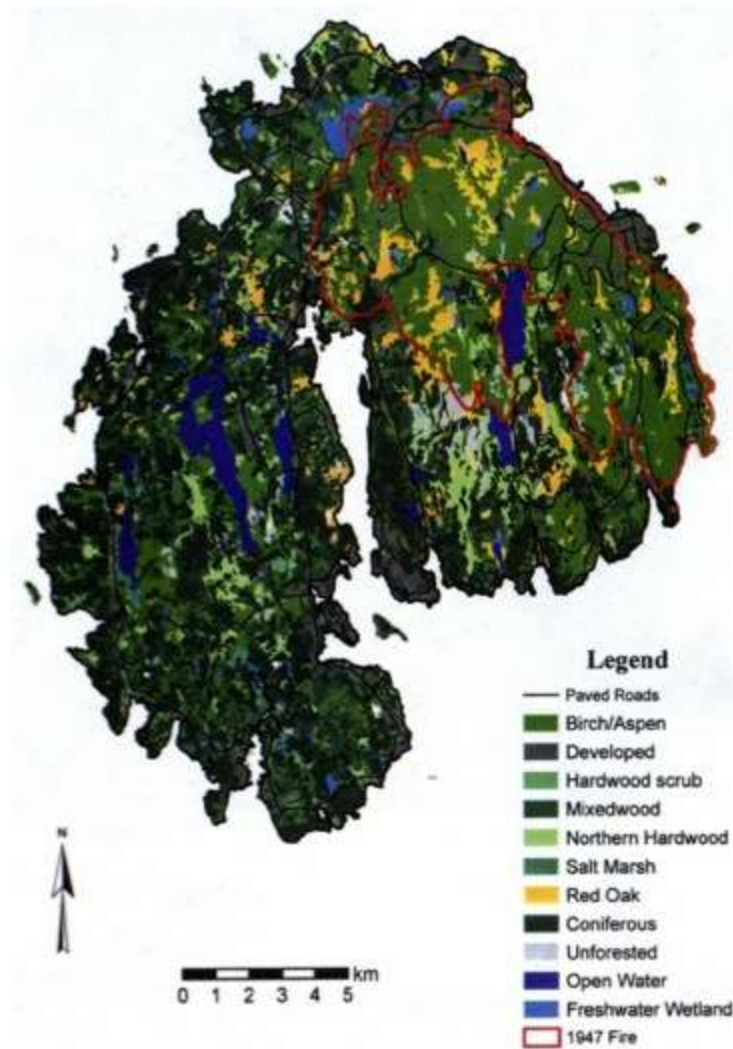


Figure 3: Vegetation Composition of Mount Desert Island Post-Fire in 1979. Note the red line of the fire and the abundance of deciduous trees it encompasses. (Fuller and Harrison 2003)

After a severe winter in 1955-1956, park managers first observed severe overbrowsing and malnutrition in the deer population since the fire (Stitt 1965). Following the initial observations, browse surveys were conducted annually to monitor forest health. Habitat continued to deteriorate from overuse in the subsequent years. In fact, vegetation in certain areas of the park, especially in the deer's winter range, were observed to be overbrowsed from 1956 until 1968 (Stamey 1969). The park decided to take interventionist action.

1960-1968: The Reduction Program

Prior to the 1960s, there was no formal deer management program or protocol within the Park. In 1960, Acadia officials met with Maine Inland Fish and Wildlife to explore management options for the overpopulated park (Stitt 1969). There was consensus that deer reduction was warranted on the Island. Ideally, both agencies would have managed the island as a single management unit, but the majority of island residents were still opposed to an open hunting season on non-park lands (Stitt 1969).

Acadia National Park began its deer herd reduction program in September 1960. The initial program provided for no more than 250 deer takes in the first year (Stitt 1969). The reduction quota for each season was based largely on the results of the previous annual browse survey and population counts (Stitt 1969). The program specified one square mile reduction areas at Valley Peak, Norumbega Mountain, Blackwoods, Jordan Pond, Long Pond, Western Sargent Mountain, Hardwood Hill and Halfmoon Pond. Specific reduction quotas were established for each area. The actual removals occurred during the months of December, January, and February, when the deer had a reduced winter range and were more easily tracked because of the snow. Most of the deer were shot and brought to Ellsworth, where the meat was processed and distributed to Hancock County school lunch programs (Bar Harbor Times 2/27/64). However there were also recorded removals due to car collisions, poaching, and dog kills (Stamey 1964, Stamey 1965).

By December of the first year, 79 deer had been removed from the park. Post-mortem analysis of these deer revealed that they were about 14% below the average weight of deer in the state of Maine (Stamey 1964). This statistic proved that the crowded

conditions due to overpopulation were causing malnourishment in the MDI deer herd. After the 1964-65 winter, 564 deer had been brought in as part of the reduction program (Stitt 1969). Acadia National Park superintendent Hubler reported that the program had been a success, stating that the overpopulation problem that existed before the start of the program was now under control (Bar Harbor Times 2/27/64).

Supervisory Park Ranger Roy Stamey, who oversaw the operations of the reduction program, felt that the “number of deer [removed] alone, however, cannot be accepted as the only measure of management success. The ability of a winter range, primarily cedar, to feed our deer herd must be considered. We must get the deer in balance with their winter food supply and once that balance is reached, we should endeavor to hold it...This was our ultimate aim so let's continue until that goal is reached” (Stamey 1964). In order to monitor this aspect of reduction success, the rangers needed to mark individuals in order to assess their range. To capture the wild deer, they used a combination of live-traps and a tranquilizing “capchur gun.” They would attach colored plastic streamers to each ear of captured individuals before setting them free, after which they would record the locations of all future sightings of the animal. By 1964, Stamey noted that their live-trapping efforts had been largely unsuccessful, having only captured 11 individuals in the four years of the program. Use of the capchur gun to tranquilize and tag animals was often unsuccessful as well; in that year three darted deer still got away, and a fourth was actually killed by the drug. Despite this, the data they collected on the marked individuals showed that their original assumption that the deer herds only ranged one square mile during the winter was false; there were individuals sighted over a mile and a half away from the point of live-trap,

and one group was known to range as far as three miles in search of food and shelter. This led Stamey to advocate for – and perform – removals outside of the original specified reduction areas (Stamey 1964).

An editorial on the park's management program by F.E. Fahey, a Southwest Harbor resident, considered "one of the best woodsmen in this part of Maine" was posted in a March '67 edition of the Bar Harbor Times. He favored Acadia's deer reduction efforts and believed hunting by people was necessary to maintain the population at a level that the island can support. However, he saw a missed opportunity to study the biology of deer. He noted information gaps in the knowledge of food needs, physiology, and population factors concerning deer. "The management program should go beyond merely removing surplus deer. It should provide the materials for scientific studies, either by biologists at the University of Maine or by scientific talent available here on the island, planned to obtain information on some of the present unknowns" (Bar Harbor Times 3/23/67).

While Fahey laments the missed opportunity for research on a wide range of deer ecology questions, at least one study was performed in conjunction with the reduction program. In 1961 there was a team consisting of University of Maine researchers, park rangers and naturalists, and a biologist from the State Fish and Game Department, that was studying the carcasses of the deer shot by the reduction program (Bar Harbor Times 4/6/1961). The purpose of the study was to 1) determine chemical and physical "yardsticks" for measuring health and general condition of deer, and 2) determine patterns of post-mortem change in deer carcasses.

The reduction program continued until 1968 (Bar Harbor Times 2/8/1968, Stamey 1969). By the end of the program, approximately 900 deer had been culled (Stamey 1969). In his 1969 report, "Problem – Overbrowsing of Winter Range by White-tailed Deer," Stamey articulated the goal of the deer management reduction program, which we assume has been the guiding sentiment up until the present:

Acadia's deer management program is designed to Perpetuate the deer herd and the vegetation in a natural and healthy condition. Vegetation is checked annually to determine the degree of use sustained through deer browsing. Continue the present research project being conducted by the University of Maine on the ecological relationships of white-tailed deer and vegetation at Acadia National Park.

1960 - 1964: MDI Deer Management Bill

While the reduction program opened up a controlled hunt by professionals within park boundaries, it was still illegal to hunt deer everywhere else on the island. In 1961, an MDI Deer Management Bill was proposed that was "designed to permit the controlled hunting of deer under the direction of the state commission of fish and game in an effort to reduce the deer herd to a number that could live on the existing amount of available food" (Bar Harbor Times 4/6/61). Representative Loren Kimball of Northeast Harbor led the opposition to the bill. He and his supporters did not believe that hunting should be opened because the wild deer were a tourist attraction and therefore helped the island economy. By April 6th, 1961, this bill had been defeated in the house, paused in the senate, and then sent back to the house where it was defeated a second time.

This was not the end of the Deer Bill, however. In 1963, Kimball proposed an amendment to the bill which would treat MDI as a single community rather than as town

units (Bar Harbor Times 2/28/63). Previously, negotiations had given each town a yes or no vote on whether or not to make MDI a deer management area. Kimball's amendment to the bill gave each individual island resident a yes or no vote on the matter, regardless of which town they belonged to. In this way, every voice was taken into consideration rather than just the majority view of each township.

As the time for the referendum approached in 1964, authorities were weighing in on the topic. Warden Cote, speaking for the state Fish and Game Department, favored the proposal. He believed that the fact that Acadia National Park had a management program was proof that there were too many deer on MDI. He believed that while the recent overpopulation crisis had been handled effectively, the park's efforts might not be enough to stop it if it happened again, and that island hunting should be opened to sportsmen to help with management. Cote noted that even if the bill passed, the State Fish and Game Department would not open hunting immediately because there were currently no problems with the herd (Bar Harbor Times 2/27/64). Park Superintendent Hubler did not take a stance on the issue, stating that the park would go along with whatever the island decided was appropriate. Hubler noted that the park's scientific studies had shown that deer had a considerable range about the island and that they traveled both ways across park boundaries. Therefore they would adjust their future management plans in accordance with what the rest of the Island was doing and continue conducting scientific studies on deer regardless of the referendum result (Bar Harbor Times 2/27/64).

In March 1964, a proposal to make MDI one cohesive wildlife management unit and permit hunting under State Fish and Game's supervision on the non-park portion of the Island was voted down in all four island towns (Stitt 1969).

Current and Future

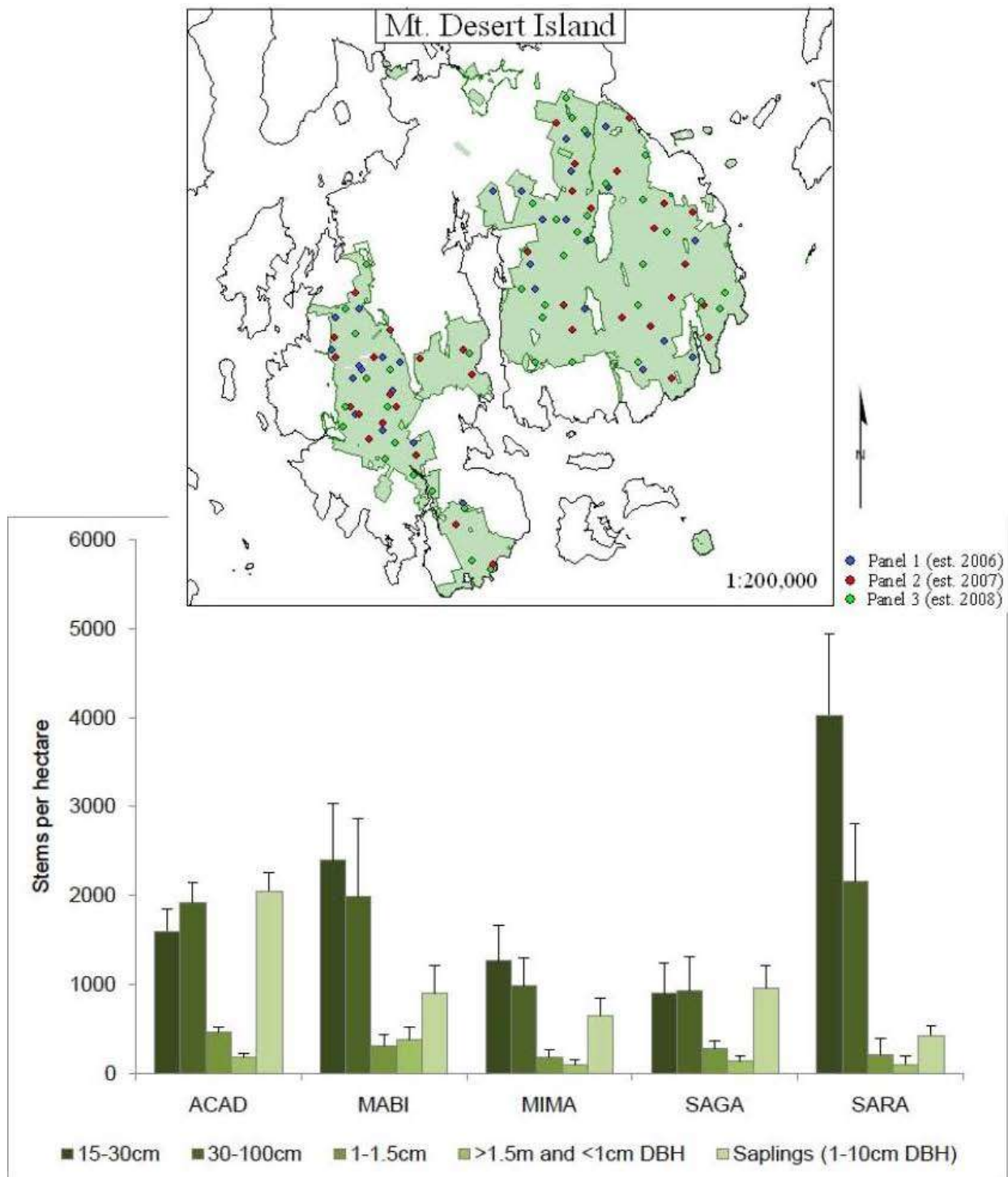
In the decades following the park's deer reduction program, the animals have stayed within the carrying capacity of the island. A browse survey in 1982 noted that although deer were distributed all throughout Mount Desert Island and Acadia National Park, the forest's regeneration was not limited by browsing, and there was no evidence of the deer's previously harmful behavior of congregating in winter yards (Gilbert and Harrison 1982). A decade later, Saeki and Harrison (1991) reported that white-tailed deer populations were staying within the island's forage carrying capacity.

As the 2006-2008 Northeast Temperate Network's Forest Health Monitoring Report accounts, historically high populations of deer are now impacting many parks in the Midwest and Northeast by limiting seed establishment and growth of trees. Many parks are lacking adequate tree regeneration due to deer browsing, which carries with it a whole host of ecological effects. There is no doubt that overbrowsing is a serious problem in New England. However, as Miller *et al.* said explicitly in their 2011 Report: "Currently tree regeneration appears to be adequate in [Acadia]...as all seedling size classes are represented...and average deer browse index is below 3" (figure: Miller *et al.* 2011).

Acadia is dominated by spruce-fir forest, which has a low palatability for the island's deer (Miller 2009). A study conducted between 1992 to 1994 showed deer populations to

be decreasing (Long et al. 1998). This study suggests that the population decline was not due to lack of food supply, but rather to low survivorship of both fawns and does. A possible increase in mortality could have been due to the incorporation of Eastern coyotes into the island ecosystem in the 1980s (Winter 1990). A study in 1992 of coyote scat revealed that white-tailed deer were the coyote's primary food source (O'Connell *et al.* 1992).

Still, the town of Bar Harbor is moving fast towards a management plan for curtailing the island's deer population. Though there is currently no specific management program in place, in the last year and a half the town of Bar Harbor implemented a new task force focusing specifically on deer management. The Deer Herd Control Task Force, a multidisciplinary group including members from the town Conservation Commission, a hunter, a representative of Acadia National Park, the local golf course, and the Bar Harbor Police Department, meets every two weeks to discuss studies and propose solutions to deer problems which are then reported to the Town Council. But if they are not responding to an *ecological* carrying capacity, what has motivated the town to explore management options?



Figures 4 & 5: Above: forest plot locations for surveys from 2006-2008. (Miller *et al.* 2009). Below: The average seedling and sapling densities (stems/hectare) observed between 2007-2010. Acadia has all age classes represented, and at healthy levels relative to other parks in the Northeast (Miller *et al.* 2011)

Deer on Mount Desert Island may be reaching the island's "social carrying capacity." In the fall of 2013, the Task Force conducted a survey of property owners in Bar Harbor in which they asked one question: "Do you believe that the current deer population in the Town of Bar Harbor presents a problem, and that management alternatives should be explored by the Deer Herd Control Task Force, with recommendations to be presented to the Town Council subject to approval by the Town?" (Bar Harbor Deer Herd Control Task Force 2013). Of the approximately 2700 surveys sent out, 1328 were returned. Of those returned, 56.3% responded, "Yes."

Landowners who condoned management made note of their primary reason for concern regarding the MDI deer population: the transmission of Lyme disease. The distribution and abundance of deer ticks is directly tied to the deer population. Many studies have demonstrated this relationship, showing that incidences of Lyme disease decrease drastically after reduction of the deer population (Telford 2000, Kilpatrick and Labonte 2007, Rand et al. 2004). Data collected from 2001 to 2011 showed that rates of Lyme disease are in an upward trend for both the state of Maine and Hancock County (Bar Harbor Deer Herd Control Task Force 2012).

The second most frequently noted concern was property damage. Current Maine hunting laws allow for residents to apply for a permit to "take" up to two nuisance deer. To be approved for licensure, the land owner must have proof of damage to property and proof of unsuccessful attempts to deter deer through other means. In the last year, around twenty permits have been acquired by Bar Harbor residents (Connery and Wheeler 2014). Residents are also concerned with the number of car accidents on the Island. Between

2005 to 2012, 348 deer-related car accidents were reported on MDI, although only accidents with over \$1000 worth of damage were included in this figure. The number of reported accidents has increased with each year. (Bar Harbor Deer Herd Control Task Force 2012).

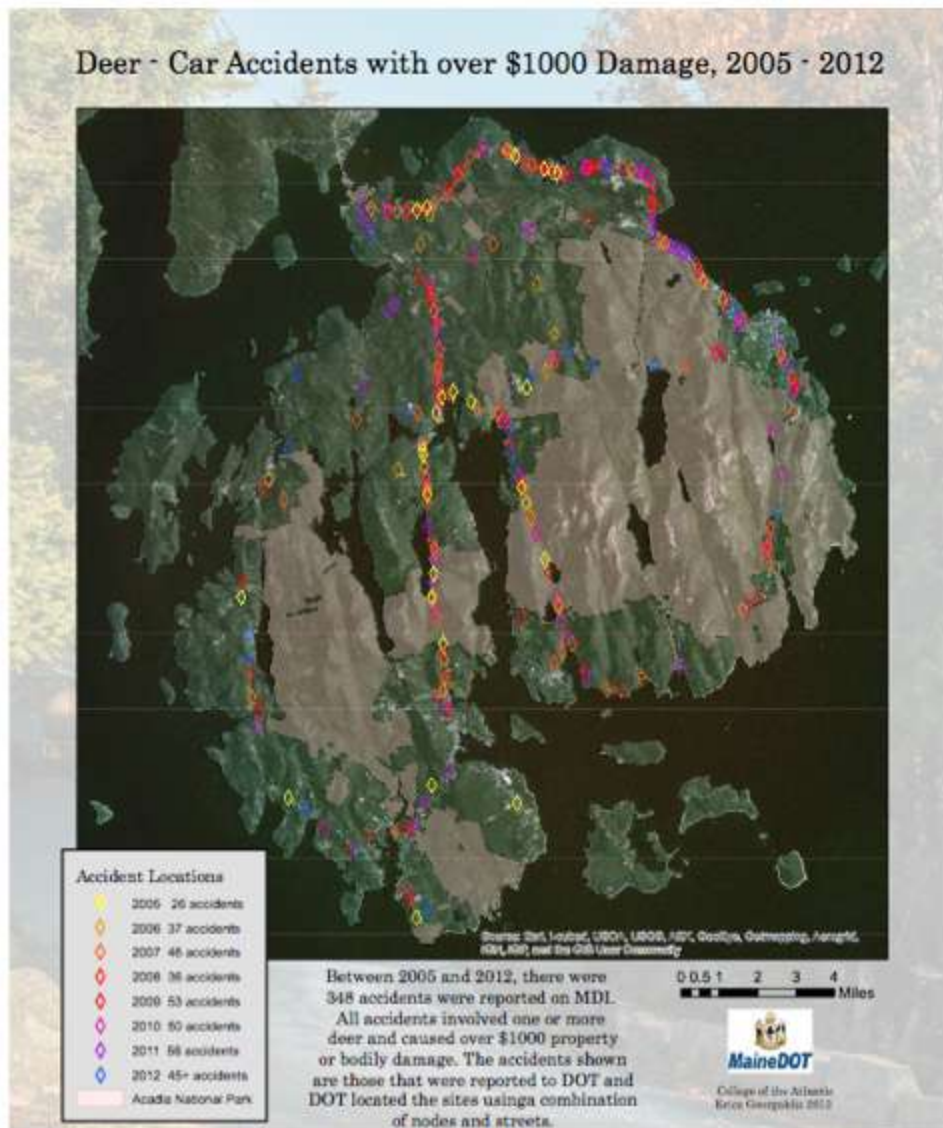


Figure 6: Locations of Deer-Car Collision on MDI between 2005-2012 (Georgaklis 2013).

The Deer Herd Control Task Force hopes to set up a two-tiered (short-term and long-term) plan for the future of deer management on the island. The short-term plan will consist of immediate and intensive management to reduce the deer population, while the long-term plan will aim to sustain desirable population levels through less extreme and more infrequent means. Management plans may include using contraceptives, trapping and relocation, or professional culls to reduce the deer population.

Each of these management strategies come with costs. It is possible that by allowing hunting on island, deer could begin to use Acadia as a refuge. While the current deer population within Acadia does not seem to be detrimentally affecting the vegetation, increased numbers could raise the intensity of browsing on native species allowing for more invasive plant takeover of habitat (Connery and Wheeler 2014). Additionally, all of these methods of management require a source of funding. To receive federal funding there must be significant evidence of the detrimental effects of deer to the island. Funding from the town is limited and also dependent on the current council members. For this reason an ideal solution would not require significant external funding (Connery and Wheeler 2014).

The necessity of a “reduction” program also comes into question. All evidence points to the main problem with the current deer population being with social tolerance. For this reason, the most effective long-term management strategy may be to reduce traffic on the island or provide ways to cope with nuisance deer other than hunting. The Task Force would like to see further collaborations with College of the Atlantic, to provide population and browse research. Tracking methods of successful deer management programs in

other areas is also recommended. Management strategies that could be considered are that of the annual deer hunt that takes place in the Quabbin Reservoir (Mass.gov) or the hiring of professional sharpshooters as was done in Princeton, NJ (Sterba 2012).

When considering the future of deer management on the Island, one must remember that MDI – as with any location – is a shifting landscape. Its ecological configuration fluctuates with each season and year; one cannot expect to find a permanent solution to the deer control problem, because the world itself is not permanent. To better understand the most appropriate management actions, it is vitally important to continue (and initiate) research on the population trends and environmental effects of deer, as well as their effect on human well-being. Any future management plans (or lack thereof), and should undergo review every couple of years with any changes in policies backed by scientific reasoning. Management must be adaptive to ensure that control efforts do not become outdated and negatively impact Acadia's deer herds, the island's natural landscape, and MDI's human communities.



Figure 7: White-tailed deer browsing on park lands by the Northeast Creek drainage. (Photo by Erickson Smith)

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