THE MOHONK TRUST September 1977

Research Report - White-tailed Deer

Deer (Odocoileus virginianus) have had a long and complicated involvement with mankind. As both organisms have increased in numbers in this region during recent decades, they have put added stress on their environments, and the interactions between them have become more complicated. This report will attempt to show some of these interactions, such as crop damage and hunting.

Chronology of Population Trends

The following excerpts from various sources indicate the long-range trends from abundance thru gradual extirpation in the late 1800's, rapid restoration, and back to abundance.

1649

A report of "The People of New Netherland," dated 1649, in the New York Colonial Manuscripts (Documents of Colonial History, vol. 1: 277-8; Albany, 1856) casts some light on the early wildlife in the vicinity of present-day New York City: "The wild animals here consist principally of lions (cougars), but they are few; bear, of which there are many; elks, a great number of deer....There are, besides, divers other large animals in the interior, but they are unknown to Christians...likewise beavers, otters, fishers, catamounts (bobcats), foxes, racoons, minks, hares, muskrats about as large as cats, martens and squirrels, some of which can even fly." (Manville)

Note that "a great number of deer" was reported along with the predators--cougar, bear, fisher and bobcat.

1842

"This well known animal is still found in almost every part of the State, where there is sufficient forest to afford them food and cover." (DeKay)

1875

Deer virtually disappeared from the Catskill area about this time due to a disastrous mansupporting snow crust and the subsequent killing of large numbers of deer. (Forest Commission of the State of New York)

1878

"The 'Middletown Journal', issue of January 13, 1878, contains a notice of the capture of a Deer, near Middletown, in Orange County. This record brings the species within the limits of the Hudson Highlands, and is the only authentic one that I know of; but I am informed that Deer are still occasionally found in the extreme

northwest corner of Orange County." (Mearns)

1890

"Deer had vanished here (Overlook Mountain, above Woodstock) as in most of the rest of the Catskills by 1890, but bears, raccoons, porcupines, and other wild creatures hung on in the less accessible parts of Overlook ready to multiply when the chance came." (Evers)

1917

Permission was received from the N.Y.S. Conservation Department to kill deer doing damage in the Mohonk flower garden. On 14 September a doe was shot, and on the 18th a doe and a fawn. Subsequently, a fawn was seen occasionally but not shot. "Great improvement in condition of Garden." (D. Smiley, Sr.)

1929

On 22 February brother Keith and I saw 8 deer, apparently 5 does, 1 buck and 2 fawns at Rhododendron Swamp. There was 15 inches of snow. Evidence of bedding down and browsing was found. This swamp lies high on the mountain above the Lueken apple orchard, mentioned later. (Author)

1931

At Mohonk in March, 19 were seen at one time at Duck Pond, and tracks were noted in the flower garden in June.

1934

On 24 November deer tracks and droppings were seen at Mud Pond south of Awosting Lake, with evidence that they had been eating water lilies.

1935

In January I estimated there were 30 deer in the Mohonk game refuge of 2,500 acres surrounding Mohonk Lake. During that winter 1 to 4 were seen at a time in various places.

1936

After his six month summer season the groom at Minnewaska told me that during all his rides he only saw a deer on that property twice, once at Awosting Lake and once in the Trapps near the Mohonk property line. Twelve were known to have been killed on Mohonk land during the hunting season that fall.

1938

The severe September hurricane took down many forest trees in the Shawangunks. Seedlings and sprouts in these openings supplied abundant browse in subsequent years and presumably contributed to the deer population increase.

1939

Two hundred Mohonk permits were issued, 12 deer reported killed. Hunting was considered poor because of drought.

1940 - 1949

During this period the records of Mohonk observations are limited. In January 1941 we saw 15 to 20 together at Home Farm. In April 1943, 19 were seen at Kleinekill. From mid-January to early March 1945, there were adverse weather conditions for deer, with 28 to 38 inches of snow and below average temperatures. No tracks were seen on the mountain. A count of 72 at one time was made at Pine Farm in February. Dogs were seen running deer in the farm area, and some dog kills were recorded. A December 1946 count of 28 at Brook Farm suggests that the population had been reduced by the snows of the previous winter.

In February 1948 Alton Quick (Park Superintendent) and I made an area-by-area estimate of deer population of 300 to 340. This was for Mohonk land within about three miles of the resort, excluding the Millbrook area to the south and the Bonticou area to the north. The natural range of deer, of course, is not confined to the mountain or by human property lines.

From late January to mid-March 1948 there was snow cover of 25 to 28 inches, with below average temperatures. At the request of the State game warden we put out some bales of mixed hay. It was not eaten. The deer were feeding on nearby sumac bark, twigs, and fruits. In April 1949 District Game Manager Bob Ohlman visited Mohonk.

"We told him that we estimated there were between 250 and 350 deer on our 7,500 acres. Last year we issued about 450 permits and we believe that 25 to 30 bucks were shot. He agreed that the above number of deer was probably too many for the property to maintain but he felt that the over-population had not yet become critical, which would be shown by their eating hemlock during the winter. It is difficult to state a figure for the number of acres per animal in such varied country but this is probably between 30 and 100.

"He agrees that there should be an open season for doe every five to ten years for good management of the deer herd. However,

he says that at present it would probably be impossible to get such a season for Ulster County because of the sportsmen and the general public. The Conservation Department did such a good job of education years ago that the public does not want a doe season, excepting where there has been great farmer pressure in agricultural counties. It will be a long time education problem. I offered our help in this locally.

"He says that in some areas illegal poaching is serving a very useful purpose in keeping down within reason the number of does but, of course, the Conservation Department cannot encourage this.

"Mr. Ohlman wasn't able to give us much help on our garden deer problem. He says that the State does not, and never has, paid for damage by deer. The State does not transplant deer as they have worked out the cost to be approximately $85 per animal. He says that in general they have found chemicals were not of much help. The new one we have just received, he says, has been helpful in some places but has yet to be proved. He says that our experience has been duplicated elsewhere that the deer soon got used to dogs. About the only thing they can suggest is an electric fence. They are going to send us information on one that has worked very satisfactorily on an estate near Suffern."

1950 - 1960

In April 1951 Alton Quick and I repeated our estimate of deer population; we arrived at 440 to 515, a 40% increase over our 1948 figure for the same area. In February 1951, 150 were seen together at Brook Farm.

In the winter of 1951-52 the deer population apparently declined. In March 1952, 75 were counted at Brook Farm (compared with 150 the year before). In October I noted that there were few on the mountain, and in December both Mohonk and Minnewaska recorded "not as plentiful as in 1950." At this time Al Roberts advanced the theory that the deer had moved into the valleys. Hunting was banned for part of November because of drought. The low number continued through the spring of 1953.

It is not apparent that this decline was caused by any of the obvious factors, such as weather or hunting. Several episodes of unusual behavior have made me wonder whether the herd was under some pathological stress at this time. In November 1950, 9 deer were killed when they ran off a ledge above Undercliff Road; an observer saw no dogs. In February 1951 several bucks were still carrying their horns, and in the farm fields half of a flock of 25 were seen to dive under a pasture fence rather than jump over it. Browsing on hemlock was noted, suggesting a shortage of preferred food. In November 1952 a buck acted in a very peculair manner at the Mountain House. Later that month 3 deer fell from the Outback Slab near the Hess house and nearly landed on a hunter, and 2 not being chased

plunged off Sky Top cliff near Pinnacle Rock having passed between hikers.

The deer population grew again to an estimated 450 by the fall of 1956. In the winter of 1958 there was up to 28 inches of snow from mid-February thru March. In April I noted that there were no recent tracks in Rhododendron Swamp. In March 1958, 79 were counted at Brook Farm and Jack Lueken's employees shot 36 in his apple orchard on Route 299, adjacent to Mohonk land.

It was during this decade that the deer problem in the Mohonk flower garden became acute. In April 1951 a permit was secured and 6 were shot. In March 1954 there was damage to shrubs, but no deer were killed. In the spring of 1955, 3 were shot, and in the winter of 1956-57, 8. Possible correlation of garden killings to the general population is thrown off by the fact that I did not always get a report from the head gardener when controls were undertaken.

1961 - 1965

This period was one of adversity for deer, with deep snow in three of the five winters and a growing season drought each year. My notes on population were consistently "few on the mountain". From mid-January to late February 1961 there was deep snow, up to 30 inches. In February I visited Jack Lueken's orchard and took pictures. There was a multitude of tracks in the 30-inch snow. Deer had cleaned up much of the cidermill pulp dumped for them. Several deer observed at close range were eating rotten apples. At Rhododendron Swamp deer had been moving thru 38 inches of snow, but apparently only a few individuals were wintering there. Problems in the Mohonk garden continued with as many as 15 seen there in November, 1964. I have no record of any being shot.

In 1965 an interesting instance of an effect of over-population of deer was reported to me by Jack Lueken. In his apple orchard the fruit showed symptoms of excess nitrogen. No fertilizer containing nitrogen had been applied to that grove during the previous four years. It was believed that this enrichment had come from deer manure and urine.

1966 - 1972

This was a period of build-up of population to a peak in 1970 followed by a decline during the severe winter of 1971, when there was up to 30 inches of snow from late January to the end of March.

In the fall of 1966 a meeting was held at Mohonk with participation by the County Farm Bureau, the Department of Conservation, apple growers, sportsmen, and landowners. Jack Lueken's orchard problem was discussed and a three-phase experiment was worked out. In October the Mohonk farms planted ten acres of winter rye on a pasture north of the orchard. In December ten truckloads of apple pomace were hauled to a field near the rye. And in February a thinning of second-growth saplings was done by volunteers to provide late-winter browse immediately NW of the orchard on Mohonk land. The

out-of-pocket expense of these operations was paid by a local sportsmen's club. Two results were significant. The experiment did reduce the feeding in the orchard, so the owner did not seek a permit for shooting deer. Second, it represented a cooperative approach to easing a problem of conflicting interests. But the relief was only temporary since only symptoms were being addressed.

There was a continuing problem in the Mohonk garden--2 deer were shot there in February 1969. In March 1971 Jack Lueken told me that 25 deer had been killed by vehicles in a one mile stretch of Highway 299 near his apple cooler. Another 10 or 12 were killed by dogs in his orchards. This was a year of adversity for deer. On 9 March 1971 following a freezing rain I took a picture which shows seven layers of crust in the twenty one inches of snow on the ground. In 1972 deer were seen in daylight adjacent to the Mohonk House during June.

1973 - 1977

During this period there was no protracted deep snow. The increase in deer population was rapid. By May 1976 I noted a browse line in the woods at Home Farm and this spring--1977--a browse line was evident at the end of the athletic field within sight of Mohonk House. A heavy acorn crop in 1973 and 1976 may have helped this build-up. There was heavy browsing on rhododendron in Rhododendron Swamp during the winters of 1975-76 and 1976-77. In February 1977 evidence of browsing on mountain laurel leaves was noted. As this is being written (2 p.m., July 20, a hot day) a doe is eating herbs within forty feet of my house. Deer continue to be a problem in the Mohonk garden, with shooting, repellants, and fencing being used, all with limited success. County Agent Bill Palmer says that this year it is impossible for growers at the foot of the mountain to get new apple trees established because of damage by deer.

Summary

In the Northern Shawangunks, according to my records, the deer population has had five periods of increase and four of decline during the last 35 years. The five increases reached peaks about 1947, 1951, 1957, 1970 and 1977. The two highest of these have been 1957 and 1977.

I believe that these changes have been caused and supported by increases in available food, especially in winter. Several factors have probably been involved for this section of the Shawangunks. Fields that were released from agriculture in the 1920's and 1930's "grew up", thereby greatly increasing the amount of shrub browse available to winter herds. Mohonk's extensive fuelwood cutting during the Depression and World War II years stimulated woody browse. The 1938 hurricane also made openings in the forest, which in turn

soon contributed to available deer food. The increase in intensively managed (and heavily fertilized) agricultural crops (apples, corn, rye cover crops, and produce) in the nearby parts of the Wallkill and Rondout Valleys has contributed to deer nourishment in both winter and summer.

Four of the five population buildups (the exception was 1951) ended with late-winter snow and temperature conditions likely to cause starvation. In each case a rapid drop in numbers followed. I have come to believe that the deer population tends to increase, and goes on increasing, till it is forcefully reduced by a severe winter. It is my belief that the rate of such increases is slowed somewhat by hunting, as well as by highway and dog kills.

The official record by the Department of Environmental Conservation of deer kill since 1954 in our four townships (Gardiner, Marbletown, New Paltz and Rochester) does not correlate well with my population estimates till recently (1973-76). The weather during November and the doe-season factor may have confused the correlations.

The number of hunting permits issued at Mohonk (for approximately 5,000 acres outside our game refuge) does not correlate with the deer population trends. If anything, the number of permits seems to go down when the deer numbers are going up. The observed kill has remained surprisingly steady--between 15 and 25 per year through the years, regardless of the total population.

Because there are public roads through the property and many kills are not reported, the total hunting season take is undoubtedly more than the known take. In 1974, 1975 and 1976, we added a brief questionnaire to our hunting permit application. If the responses are extrapolated to cover all permit holders, then the number of deer taken legally was about 70 and the hunter success rate about 9%.

Deer that escaped, or were liberated, from the Mohonk paddock probably contributed very slightly to the herd on the mountain (see Appendix I). Likewise, deer shot in the garden, under permit, were doubtless an insignificant subtraction from the total population (see Appendix II).

In Appendix III will be found available information on deer population in the Minnewaska—Lake Awosting area. It seems that the trend of numbers there is similar to Mohonk's but lags behind. This difference may be due to less browse available on their poorer soils and greater distances to better foods in the valleys.

It is my opinion that the deer population in the vicinity of Mohonk Lake is currently the highest it has been in my lifetime. There is much evidence for this. This year browse lines have appeared in the forest where I have never seen them before. Deer trails that I have been mapping for some years have become more evident because of heavy use. This summer deer have frequently been seen browsing in broad daylight within sight of the Mohonk Mountain House and its adjacent buildings.

The accompanying chart shows graphically some of the relationships discussed above. Unless disease enters the picture, it seems likely that deer will continue to be the cause of conflict of human interests until a severe winter produces a temporary reduction in population.

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Appendix I

Deer in Captivity at Mohonk

A small deer paddock was long ago established at the eastern edge of the present Mohonk garden below Huguenot Drive. The date has not been discovered but may have been early in the 1880's. In 1904 a sixteen-acre paddock was fenced within sight of the Mohonk Mountain House, to the west and north of Copes Lookout Road. We believe that this was stocked with deer from Virginia (presumably the race Odocoilus virginianus virginianus). Thus, as these deer escaped they undoubtedly interbred with the wild ones which I believe were the northern race, borealis.

The natural browse must have soon been exhausted in the paddock and for the next forty years feeding was required, consisting of various grains (usually the same as was being fed to Mohonk horses) and mixed hay. In summer this was supplemented to a small extent by green leaves picked by guests and fed to the deer from Pine Hill Road. Sassafras was the favorite, by the guests. The deer responded to the call "co-boss" (= come bossy?)

The Mohonk paddock was operated under a State Propagation license ($1.00 fee) with yearly reports to the Conservation Department. As I remember the herd varied from 6 to 40 animals. From time to time the number was reduced in the fall by shooting by a staff member and the meat was served in the employees' cafeteria.

In 1940 some deer in the paddock were lost thru malnutrition. A diagnosis was made by the Bronx Zoo veterinarian that it was due to inadequate and insufficient food. Soy-bean meal as a supplement helped to correct the diet problem.

During World War II major fence repairs were impossible. On several occasions dogs got in and chased deer, which made them wild and less visible for guests.

By the fall of 1947 the deer paddock fence had rusted to the point where costly complete replacement would have been required. Since the entertainment value of the deer had decreased, as more could be seen outside the paddock, it was decided to let the deer escape. Some 17 animals were involved.

The large number of deer in the paddock for 40 years meant that no ground cover except moss could exist. All shrubs were killed by browsing and tree reproduction was prevented. The one exception to the above was the Mountain Laurel. This was avoided by the deer and flourished. It made a noteworthy display in June, particularly in the openings that resulted from the loss of American Chestnut in the 1920's. Now, thirty years after the liberation of the deer, Black Birch, Hemlock and other pioneer species are filling in.

Several deer trails are currently in use thru the former paddock, and a browse line has begun to show on the NE side.

Appendix II

Repellants

In response to those who urge that the answer to orchard and garden deer damage problems is some form of repellant, I cite our extensive experience in the Mohonk garden. In the early 1930's a small dog following the head gardener apparently left a scent that repelled deer. Later it took a dog tied at night in the center of the ten acres. When that became ineffective, kerosene lanterns and pieces of reflective metal were hung above the beds. At one point a watchman patrolled the garden during the hours of darkness. This was abandoned when it was observed that deer were moving aside ahead of him and closing in behind him!

We have gone thru several episodes of repellants, from lion dung to expensive chemical formulations. Some of these were unacceptable aesthetically while others were offensive to human noses. None continued to be effective. The most recent repellant consists of perforated plastic bags of human hair from local barber shops! It is my opinion that any repellant that seems effective temporarily is nullified by the food stress which accompanies the next increase in deer population around the garden.

For those who are suffering deer damage, I can only suggest that they hope for deep snow in late winter or follow the legal procedures which permit killing individual deer caught in the act of damage. This solution will not be happily received by some segments of our society! White-tailed deer in the Northeast are a complex and fascinating problem that involves human factors along with those which are beyond human control.

Appendix III

Observations of deer in the Lake Minnewaska, Palmaghatt, and Sams Point area have not been extensive. In April 1951 I saw many tracks in the Palmaghatt, and I was told by Ken Phillips that they were having a deer problem in the Wildmere garden for the first time. In June 1952 I saw evidence of browse near the Cliff House. In June 1954 deer browse was still evident in the Palmaghatt. In April 1958 I noted browsing evidence at Verkeerderkill Falls and many deer tracks at Lake Awosting. That August there was noticeable browsing at Millbrook Mountain. In May 1959 I recorded heavy browsing in Black Ash Swamp below Gertrude's Nose, and many tracks near Mud Pond. In April 1961 browsing was seen in the Palmaghatt. In March 1971 Spencer Schoonmaker was reported to have counted 160 deer in sight at one time on his farm, near Bruinswick in the valley south of Lake Awosting.

Hunting has been permitted in the 1,600 acre portion of Minnewaska State Park north of route 44-55 with the following results (noted in the Palisades Interstate Park Commission's annual reports):

	Registered Hunters	Deer Taken Archery	Gun
1973	439	0	8
1974	763	1	2
1975	718	0	6
1976	788	0	10

Appendix IV

Sunspot Cycles - A Hypothesis

A possible relationship between sunspots and weather is again being studied by climatologists. There is some evidence of up to a 40 percent increase in snowfall in years following sunspot maximums.

Four of the five deer population buildups (except 1951) ended with late-winter snow and temperature conditions likely to cause starvation. Four of the declines started one or two years after maximums in the sunspot numbers curve. I am suggesting here that the deer population goes on increasing till it is reduced by a severe winter, which follows a few years after a sunspot maximum. This hypothesis is perhaps reinforced by the fact that I did not record a population increase in the early 1960's when one might have been expected. In the years 1961 thru 1964 there were late winter periods more or less hard on deer, accompanied by growing season droughts, which were recorded by narrow growth rings on four species of Shawangunk trees. Thus, I believe that between sunspot maximums there may be population limiting factors of weather from other causes.