

Deer Damage Management Plan
for the
Rutgers Ecological Preserve and Natural Teaching Area

Prepared
By
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Introduction

The Rutgers Ecological Preserve and Natural Teaching Area is a designated 316 acre tract of land that is part of a larger 425 acre tract of undeveloped forest land (Figure 1). Adjacent to the grounds of the former World War II Camp Kilmer, the EcoPreserve directly abuts with Rutgers University's Livingston Campus. Rutgers acquired the land in stages with the first acquisition in 1945 and the last in 1963. The EcoPreserve was established in 1976 by the Rutgers Board of Governors with the goal of preserving the natural ecological characteristics of the property and that it serve as outdoor teaching area for the university.

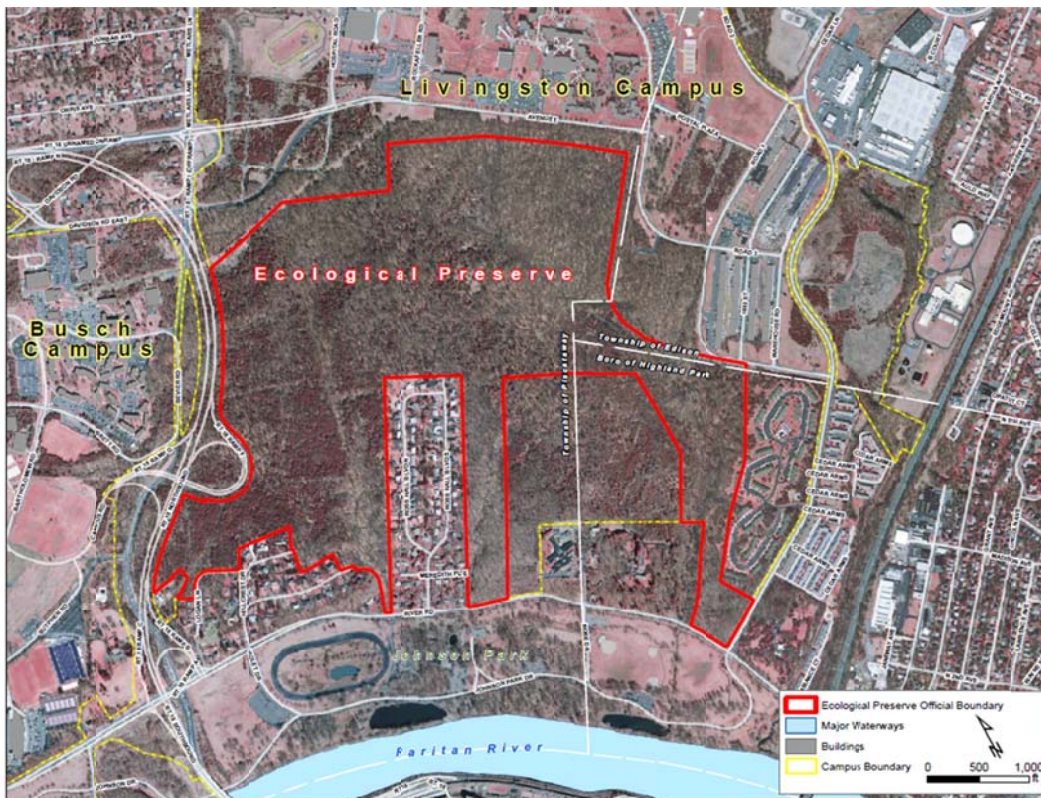


Figure 1. Rutgers Ecological Preserve and Natural Teaching Area with “Official” boundary as designated in 1976.

Vegetation Communities

Mid to late successional forest covers a majority of the preserve. Dominated by red cedar (*Juniperus virginiana*), pin oak (*Quercus palustris*), white ash (*Fraxinus americana*) and red maple (*Acer rubrum*), these portions of the Preserve are typical of successional forests at the wetter end of the soil moisture gradient in New Jersey's Piedmont physiographic province (Robichaud and Buell, 1973). A large tract of mature (100+ years old) upland forest, locally known as Kilmer Woods, is found in the northeast corner of the Preserve and extends down along Buell Brook and the adjacent bluffs to the Preserve's southern border. Historical records and tree ring analysis indicate that the Kilmer Woods area has been forested since the mid-1800's (Stiles, 1978). This forest is dominated by a mixture of red, black and white oak (*Quercus rubra*, *Q. velutina* and *Q. alba*, respectively), shagbark hickory (*Carya ovata*), beech (*Fagus grandifolia*), sugar maple (*Acer sacharrum*) and black cherry (*Prunus serotina*). Flowering dogwood (*Cornus florida*) and hop hornbeam (*Ostrya virginiana*) can be found in the sub-canopy. Similar mature forest stands are also found along the two unnamed streams that bracket Ross Hall. While similar tracts of mature (100+ year old) upland forest can be found at Rutgers Hutcheson Memorial Forest and Helyar Woods, forests of this advanced age are relatively uncommon across the rest of Middlesex County.

Descriptions from the 1970's time period (Stiles, 1978; Pickett and Kempf, 1980; Nicola and Pickett, 1983) note an extensive understory layer of native shrubs such as mapleleaf viburnum (*Viburnum acerifolium*), arrowwood viburnum (*V. dentatum*) and spicebush (*Lindera benzoin*). Our present day sampling records indicate that these species are largely absent from the Preserve. The native shrub, witch hazel (*Hamamelis virginiana*), which can be found but is relatively uncommon. Similar accounts suggest that vernal wildflowers such as May apples (*Podophyllum peltatum*) and spring beauties (*Claytonia virginica*) used to blanket the forest floor in spring (Stiles, 1978). While spring beauties are still quite abundant, May apples and trout lilies (*Erythronium americanum*) are comparatively uncommon and only rarely have been observed flowering. All these species are typical of rich moist mature forests like Kilmer Woods. The notable absence of native understory shrubs, tree saplings and wildflower species provide strong evidence of the influence of excessive browsing by white-tailed deer (*Odocoileus virginianus*).

To provide some further insight on the effect of deer browsing, a series of deer exclosures were constructed and experimental plantings of tree seedlings and shrubs were undertaken in the fall of 2011. We undertook a "sentinel seedling" study in which we planted three hundred red oak seedlings in the EcoPreserve using a stratified random sampling design and established protocols (VanClef, 2007). In December 2011, two hundred and eighty nursery raised seedlings (from 1 to 2.5 feet tall) were planted in the forest understory in 28 different plot locations (10 saplings per plot) and 20 seedlings were planted in two different deer exclosures to serve as a control. Follow-up studies were undertaken in June 2012 to quantify the percentage of seedlings and buds that were browsed by deer during the intervening seven month period. Approximately 60% of the red oak seedlings had been browsed, while 100% of the controls were

unbrowsed (Figure 2). Measurements of understory plant density in the Kilmer Woods section were also undertaken during the 2011 and 2012 and show a low level of native understory plant cover (i.e., forest secchi readings of < 10% native plant cover). Comparison with data from other open space lands suggests that browsing pressure on the EcoPreserve is towards the higher end of those recorded using similar sentinel seedling techniques (VanClef, 2007).

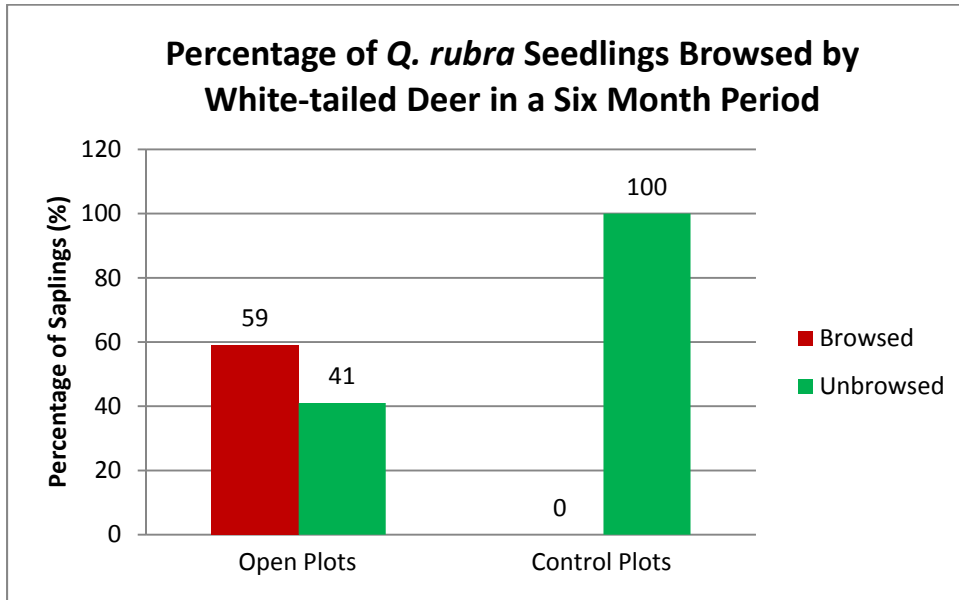


Figure 2. Results of the sentinel seedlings deer browsing experiment.

Similar loss of native understory shrubs, tree seedlings/saplings and wildflowers due to deer browsing have been documented throughout the northeastern and midwestern United States (Sauer, 1998; Opperman and Merenlender, 2000; Cote et al., 2004; Russell and Fowler, 2004; Whigham, 2004; Rossel et al., 2007), as well as secondary impacts on native fauna such as songbirds (deCalesta, 1994). It is worthwhile to note that Helyar Woods, which until only recently did not have a significant deer population, and has since been the subject of a controlled deer management program, still has an extensive cover of native shrubs and spring wildflowers.

Recent vegetation inventories (Merchant, 2011) document that the understory of native shrubs has been replaced is a host of exotic invasive shrub species such as European buckthorn (*Rhamnus cathartica*), Japanese barberry (*Berberis thunbergii*), privet (*Ligustrum sp.*), and brambles such as wineberry (*Rubus phoenicolasius*) and multiflora rose (*Rosa multiflora*). The herb layer is now dominated by Japanese stiltgrass (*Microstegium vimineum*), garlic mustard (*Alliaria petiolata*) and Japanese honeysuckle (*Lonicera japonica*). Chinese bush clover (*Lespedeza cuneata*) has invaded some of the disturbed open areas near the RUEP parking lot and the abandoned Kilmer-era ammo bunkers. Mile-a-minute vine (*Persicaria perfoliata*) has completely taken over the wetland openings in the northern section of the Preserve. In addition, there are several

exotic tree species such as ailanthus (*Ailanthus altissima*) and Norway maple (*Acer platanoides*) are scattered throughout the Preserve.

Overall the mature forest of Kilmer Woods shows a higher degree of integrity (i.e. a higher Plant Stewardship Index) as compared to the early and mid- successional forests on the Preserve. While the Kilmer Woods has an intact forest canopy dominated by native tree species, the understory of shrubs and herbs often exhibits a lower degree of integrity (i.e. lower Plant Stewardship Index). For example, in some locations in Kilmer Woods, the herb layer is completely dominated by a dense layer of Japanese stiltgrass (*Microstegium vimineum*). This situation is even more common in the mid successional forest stands. Where there are canopy gaps, brambles such as wineberry (*Rubus phoenicolasius*) and multiflora rose (*Rosa multiflora*) may quickly invade. The southeastern section of the Preserve, including the Cedar Lane Tract B, is heavily invaded by a number of these exotic species. The dominance of these species may be impeding normal native vegetation succession and some areas remain a shrubby overgrown thicket. Several of the wetter areas (including areas of designated/mapped wetlands) are dominated by non-native shrubs (such as privet and buckthorn) and completely lacking in expected native species such as spicebush (*Lindera benzoin*).

The vegetation surveys indicate that the EcoPreserve is suffering from an over-population of deer that is heavily browsing the forest understory and herb layer. Our best judgment is that this overbrowsing by deer coupled with competition from exotic invasive shrubs and herbs over the past three decades has substantially and negatively impacted the forest understory. In addition, these same factors may also severely affect the future composition of the forest overstory by inhibiting the regeneration of desirable species of native trees. Gaps created by fallen trees would normally be quickly filled by regrowing saplings. Without advance regeneration of native tree seedlings and saplings, the forest is not able to respond to natural disturbance events such as the recent SuperStorm Sandy. Follow-up sampling during subsequent years will provide better documentation of the effects of deer browsing and possible effect of the proposed deer management.

Deer populations and associated impacts

Due to the difficulty of censusing wild animals in their natural habitat, we do not have an absolute count of deer numbers. Based on a recent spotlight sampling of a portion of the EcoPreserve (approximately half of the entire EcoPreserve property and neighboring university lands), we estimate a population density of approximately 100+ deer per square mile. As way of reference, wildlife researchers have estimated that deer densities of 10 per square mile were typical prior to colonization of the United States (McCabe and McCabe, 1984) and negative effects impacts to forest health become noticeable above this level (deCalesta 1994, deCalesta 1997). Natural resource management experts suggest that there is no single “magic number” as to an optimal population density of deer, as every forest is different. The key is whether there is observable evidence of the negative ecological and social consequences of overabundant deer, as is the case in the EcoPreserve.

Overbrowsing by deer coupled with competition from exotic invasive shrubs and herbs over the past three decades has substantially and negatively impacted the ecological structure and function of the EcoPreserve. It should also be noted that an overabundance of deer is also a public safety issue in the form of over 50 deer-induced vehicle collisions in the vicinity of the EcoPreserve reported to University police between 2003-2011 (2011 Bloustein Raritan River Studio). A more recent survey of both the University and local police forces recorded over 85 deer-vehicle collisions during the past three years (2010-2012).

Deer management options

Similar forces are affecting forest lands throughout New Jersey and the MidAtlantic states (Sauer, 1998; Opperman and Merenlender, 2000; Rossel et al., 2007). The general consensus of the scientific and natural resource management community is that deer populations are out of balance and need to be actively managed (for more information, go to: <http://deerinbalance.org/deer-overabundance-research/>.) For an excellent on-line tutorial that explores impact of deer overpopulation on forest structure and health go to: <http://www.deerandforests.org/habitat>. Active management of deer overpopulation may take the form of excluding deer altogether through exclusionary fencing and/or through various forms of regulated hunting (DeNicola et al., 2000; Northeast Deer Technical Committee, 2008).

To assess the feasibility of fencing the EcoPreserve, a mapping analysis was undertaken examining several options from fencing the entire Preserve to fencing the eastern 2/3s to fencing only the Kilmer Woods/Buell Brook and adjacent areas (Figure 3). Using the figure of \$10 per linear foot to estimate costs (based on personal communication with Leslie Sauer), the costs are estimated to range from \$140,000 to \$250,000.



Figure 3. Potential deer management fencing options.

While extensive fencing of part or a portion of the EcoPreserve, would have certain advantages, we presently do not have the requisite funding. In the meantime, the RUEP Advisory Committee has recommended that a managed hunting program be initiated. Many preserves and open space conservation lands employ managed hunting programs (i.e. not open to all recreational hunters but rather controlled access to licensed, vetted and permitted hunters only). The New England Chapter of The Wildlife Society and the Northeast Deer Technical Committee (NEDTC, 2008) reviewed various deer management options. The report concludes:

“One hundred years of research and management experience throughout the United States and eastern Canada has shown regulated hunting to be an ecologically sound, socially beneficial, and fiscally responsible method of managing deer populations. Options routinely suggested as alternatives to regulated hunting are typically limited in applicability, prohibitively expensive, logistically impractical, or technically infeasible. As a consequence, wildlife professionals have come to recognize regulated hunting as the fundamental basis of successful deer management.”

2012-2013 Deer Damage Management Plan

Under the proposed deer damage management plan, the EcoPreserve will not be open to general recreational hunting but rather access will be limited to a smaller number of permitted hunters. The deer damage management program is coordinated by natural resource and wildlife conservation professionals on the Rutgers University staff. The plan has been reviewed and approved by the members of a Deer Management Advisory Committee which includes participation from RU Police Department, Office of Risk Management, and Facilities, as well as by the RU EcoPreserve Advisory Committee and the Dean of the School of Environmental and Biological Sciences. Conservation officers of the New Jersey Division of Fish & Wildlife will also monitor the conduct of the hunt to ensure that all relevant NJ hunting regulations are followed.

The goal in 2012/2013 will be to remove twenty five antlerless deer, mostly mature does, which is consistent with recommendations in the Fish & Wildlife Landowner Guide. Hunters will be requested to harvest 2 mature does before a buck can be harvested. The objective is to reduce the overall population of deer by reducing the number of reproducing does. We will continue to monitor the size and health of the deer herd, as well as the regeneration of the vegetation in the EcoPreserve to determine the proper levels of deer harvesting needed to reduce damage to forest health.

All NJ licensed hunters (<http://www.state.nj.us/dep/fgw/licenses.htm>) may apply to participate in the EcoPreserve deer management program. However before being permitted to hunt, hunters must pass a background check with no prior NJ fish and game violations, pass a bow-hunting proficiency test, and post the required liability insurance. Each hunter will be required to shoot their bow to demonstrate their proficiency and safety to a Rutgers University designated official. Only 10 to 15 hunters will be permitted to hunt the property. Hunting will be limited to preset times and geographic zones and open only to properly licensed, vetted and permitted hunters.

Each hunter will receive a copy of the deer management plan and must carry a Hunt Smart Courtesy Card while on Rutgers property. Permitted hunters are also expected to work within the provisions of the plan and notify Rutgers University Police department whenever they enter and leave the property.

Hunting will take place in only in a limited portion (approximately 75 acres) of the EcoPreserve that is not traversed by marked trails (see Zone 1a, 1B and 1C on attached map) and not adjacent to residential areas (Figure 4). Township of Piscataway regulations on 500 ft no hunting zones around private parcels will be followed. Hunting also will not be allowed within 150 feet from marked recreational trails and roads. The managed hunting program for this year will be open only from December 22, 2012 to Jan18, 2013.






RUTGERS

**Rutgers Ecological Preserve and Natural Teaching Area:
Deer Management - Bow Hunting Zones: 12/22/2012 - 1/18/2013**



The Rutgers Ecological Preserve and Natural Teaching Area on Rutgers University's Livingston Campus has approximately 73 acres of land available for deer hunting (bow only) as shown on this map. Also shown are areas closed for hunting; these areas were delineated by generating buffers from private parcels, Rutgers-owned parcels, Eco Preserve trails, adjacent roads, and clearings.

For more information, please go to <http://ecopreserve.rutgen.edu>.

-  No hunting areas
-  Parcels in private ownership sharing boundary with RUEP
-  Parcels in Rutgers ownership sharing boundary with RUEP
-  Trails
-  RUEP boundary

Orthophotography image date: 04/2007

Data Sources: No hunting buffers, Trails: CRSSA; Eco Preserve boundary: Rutgers Office of University Planning and Development RUOPD, revised by CRSSA; Parcels: RUOPD, NJDOT Office of GIS; Image data source: NJDOT Office of GIS; Map composed by the Grant F. Walton Center for Remote Sensing and Spatial Analysis (CRSSA), Rutgers University, 2011, 2012 (rev. 11/30/12)

Figure 4. Managed hunting zones.

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