

**Report of the  
Sustainable Forestry Technical Advisory Committee  
to the Highlands Water Protection and Planning Council  
March 28, 2006**



## Executive Summary

In accordance with the Highlands Water Protection and Planning Act and the subsequent actions of the Highlands Water Protection and Planning Council, this Technical Advisory Committee has been organized to address those issues regarding the practice of “sustainable forestry” within the Highlands region of New Jersey. The subject of forest management is highly appropriate for the Council’s consideration since forests are by far the dominant land use within the Highlands, and due to its intersection with issues such as water yield and water quality, wildlife management including improving biodiversity and the perpetuation of protected species, protection of soils, and the conservation of private and public open space. This Technical Advisory Committee first met in August of 2005 and identified and discussed certain issues of importance. Since that time, members of the Committee have continued that dialogue.

At the request of the Council, this Committee again convenes on March 28-29, 2006 in order to comment on a draft technical report and the preliminary draft of the Regional Master Plan. To this end, the Committee recommends the following agenda:

- To meet the needs of a growing population partly by increasing water yield through sustainable forest management of watershed lands.
- To protect water quality through scientifically-based and proven Best Management Practices
- To encourage biodiversity through creation of multiple-species forests with multiple age classes, regardless of public or private ownership, specifically through harvests that create early successional forests aged 0 to 20 years
- To encourage biodiversity through improvement of understory flora
- To utilize established and proven methods to “restore” forests damaged by natural or unnatural agents
- To work towards placing all State-, county-, and municipally- owned open space under active forest management plans
- To recommend, when appropriate, that DEP Division of Parks and Forestry and Division of Fish and Game lands be certified as sustainably managed by an independent third-party certification program such as Sustainable Forest Initiative
- To standardize municipal land use laws within the Highlands Preservation Area and those municipalities who choose to “opt-in” where those laws affect tree cutting or forestry in accordance with Section 30a(7) of the Act
- To standardize or improve conservation easements and restrictions funded by, approved by, or relating to the Highlands, in order to allow forestry in accordance with Section 30a(7) of the Act

Further, the Committee has identified certain issues that could degrade the overall quality of the Regional Master Plan. These issues regard the due diligence in investigating the methodology of the Landscape Project, flaws in the definition of rare species, distinguishing between temporary edge effects and permanent forest fragmentation, endorsement of wildlife habitat improvement, distinguishing between temporary and permanent visual impacts, and the desirability of wood as a renewable resource for various uses.

## Background

*“Next to the earth itself the forest is the most useful servant of man. Not only does it sustain and regulate the streams, moderate the winds, and beautify the land, but it also supplies wood, the most widely used of all materials.” – Gifford Pinchot, 1905*

*“Water, in all its uses and permutations, is by far the most valuable commodity that comes from the forest land that we manage, assist others to manage, and/or regulate.” – National Association of State Foresters, 2004*

*“The Legislature therefore determines... that it is in the public interest of all the citizens of the State of New Jersey to enact legislation setting forth a comprehensive approach to the protection of the water and other natural resources of the New Jersey Highlands...” – NJ Legislature, 2004*

Public knowledge of the connection between forests and water quality, albeit anecdotal, predates the establishment of scientific forestry in America. The unsustainable and heavy-handed exploitation of the forest resource in the latter part of the 19<sup>th</sup> century was pronounced and unmistakable. In the NJ Highlands region (as well as Pennsylvania and southern New York), demand from sawmills and for charcoal resulted in dramatic cutting. Erosion, particularly after forest fires had swept through harvest areas, had a severe impact on water resources. That impact on drinking water and, to a lesser extent, scenery, helped to drive forest protection legislation on federal and state levels, particularly in the decade between 1892 and 1911 (Zon, 1912).

Beginning with the emigration of professionally-trained German foresters in the 1880's, and gaining momentum with the return of Gifford Pinchot from the French National School of Water and Forests, scientific forestry began to take root in America. The year 1900 would include the founding of the Society of American Foresters. However, due to market conditions and the problems endemic with a new science, scientific forestry did not take hold on private land in many regions until well into the 20<sup>th</sup> century (McMartin, 1994).

With the establishment of the USDA Forest Service and the initial and subsequent cadre of foresters interested in the relationships between forests and water, came watershed research. These scientific experiments began in Colorado in 1911. For the eastern US, the lion's share of scientific data has come from the USDA Forest Service's Forest Experiment Stations in Hubbard Brook, NH; Fernow, WV; and Coweeta, NC. The USDA Forest Service's studies in the east have been conducted more or less continuously since 1940.

Further, the Society of American Foresters currently holds 48 colleges and universities to have accredited professional forestry degree programs. Many, if not most, of these institutions as well as other universities and land grant colleges also provide valuable research for the greater forestry community. The USDA Forest Service also maintains a Research and Development group, which staffs and guides research at various Forest Experiment Research Stations throughout the nation.

Active forest management in New Jersey dates back to 1905, with the creation of the Forest, Park and Reservation Commission, and the purchase of the five original State forests and parks. During the Great Depression, extensive forestry work, primarily on public lands, was accomplished by the 49 or so Civilian Conservation Corps companies organized within New Jersey (1933-41). A total of, 13 companies were stationed in the NJ Highlands region (NACCA, 2006).

From that point forward for the next 50 years, government policy fostered acceptance of contemporary forestry on private lands. Through technical outreach, the NJ Forest Service planned reforestation, marked forest thinning, and planned and executed timber sales on private lands throughout the Highlands region.

On State Parks and Forests, management plans were developed, executed and revised at twenty to twenty-five year cycles. Most, if not all, State Parks and Forests had a management plan developed by the NJ Forest Service. Larger parks and forests were actively managed, primarily for forest products, until the mid-1980's.

In 1982, during a budget crisis, the funding for the NJ Forest Service was dramatically reduced. Foresters were laid off by the State, and the private lands management outreach program was extremely curtailed. Aspects of private lands outreach still exist, such as the state tree seedling nursery, the forest entomology program, and administration of federal and state incentive programs.

The abrupt slowdown of management on public lands was almost as pronounced. Few, if any, management plans for State Parks and Forests have been updated since the early 1980's. In the northern half of the state, limited management activities have been carried out in large forests, such as Stokes State Forest. However, many of the projects have been bogged down due to the expiration or obsolete nature of the underlying management plans, particularly the lack of protected resource considerations in the outdated plans. While recent strides are being made within DEP Natural and Historic Resources (which includes the Division of Parks and Forestry and Division of Fish and Wildlife), the first updated management plan under the new DEP land use policy is still many months from its first draft.

In 1963, a constitutional amendment was passed by the NJ Legislature, allowing a property tax valuation based on agricultural or horticultural use. The following year, the Farmland Assessment Act was passed. Widely publicized as an effective and low-cost solution to conserving open space in New Jersey, the Farmland Assessment Act blended the desperate need for property tax equity by farmers with the conservation and scenic concerns of the urban population. The Farmland Assessment Act defines "agricultural use" as:

*"Land shall be deemed to be in agricultural use when devoted to the production for sale of plants and animals useful to man..."*  
(NJSA 54:4-23.3)

As property taxes increased in the late 1970's and early 1980's, sometimes dramatically, many forest land owners began to apply for Farmland Assessment. This trend was first reported by the Division of Taxation in 1976, when 47,825 acres of non-appurtenant woodlands were recorded,

compared to 297,687 acres of total woodlands (Div. Tax., 1998). Landowners used the justification that trees were “plants... useful to man.” Many within the NJ Forest Service and the forestry and conservation community were concerned that the Farmland Assessment Act, as it then existed, could favor excessive and unnecessary cutting of trees, and would undermine foresters’ authority to justify judicious and necessary harvests (Goodenough, 1986).

Therefore, in 1986, the Farmland Assessment Act was modified to standardize forest planning and establish criteria for practicing foresters. Specifically, the definition of “agricultural use” was expanded to include:

*“The landowner establishes and complies with the provisions of a woodland management plan for this land, prepared in accordance with policies, guidelines and practices approved by the Division of Parks and Forestry in the Department of Environmental Protection, in consultation with the Department of Agriculture and the Dean of Cook College at Rutgers, The State University, which policies, guidelines and practices are designed to eliminate excessive and unnecessary cutting;” (NJSA 54:4-23.3a)*

The Highlands region was one area of the state that saw early enrollment (pre-1986) into the Farmland Assessment program by lands that were primarily forested. This was especially true in municipalities with very high values for unimproved land, such as northern Somerset County, northern Hunterdon County, and Morris County. In 1989, there were 384,737 acres of woodland in the Farmland Assessment program, of which 137,764 acres were considered non-appurtenant (Div. Tax., 1998). In 2004, the 88 municipalities in the Highlands region contained 100,616 acres of woodlands enrolled in the Farmland Assessment program. Of that total, about 75% were under an active woodland management plan, also known as a forest management plan (NJ Forestry Association, 2005).

Sustainability has been synonymous with forestry since the first foresters arrived.

*“The forester considers his property as a permanent investment, to produce revenue constantly and forever, in increasing rather than decreasing ratio. The factor of permanence is ever present in his methods.” (Fernow, 1891 in McMartin, 1994)*

To this end, the term “sustainable forestry” would have been seen as redundant. However, beginning in the 1990’s, industrial forestry, particularly in the American west, was challenged by advocacy groups claiming that the forest lands were being harvested in an unsustainable fashion. Company foresters’ claims to the contrary were viewed skeptically by some due to their economic interest in defending their employer. The term “sustainable forestry” was coined to describe forestry practices that have been certified as being sustainable for commodity and non-commodity (including water and protected flora and fauna) uses by a third party.

Forest Stewardship Council and Sustainable Forestry Initiative have led the way with regard to third-party verification standards on industrial and public forest lands throughout the United States for the last 10 years. Recently, the Tree Farm program of the American Forest Foundation has established a similar program designed specifically for non-industrial private forest land owners, such as those found in the NJ Highlands.

Standardized definitions are deeply important for effective communication. The Dictionary of Forestry (Helms, 1998) is the standard source for natural resource professionals. For those terms not specifically defined within the Dictionary of Forestry, reasonable approximations are made based on key elements within definitions of related terms.

“Forest and ecosystem” is defined as:

*“characterized by more or less dense and extensive tree cover, often consisting of stands varying in characteristics such as species composition, structure, age class, and associated processes, and commonly including meadows, streams, fish and wildlife” (ibid)*

“Ecosystem management” is defined as:

*“management guided by explicit goals, executed by policies, protocols, and practices and made adaptive by monitoring and research based on the best understanding of the ecological interactions and processes necessary to sustain ecological composition, structure, and function over the long term” (ibid)*

A healthy forest ecosystem is

*“(1) reasonably free from uncharacteristic and environmentally and economically undesirable wildfire, pests, diseases, and other damaging agents; (2) productive over the long-term; (3) growing at an optimum or near-optimum rate; (4) adequately stocked, but not overstocked; (5) able to accommodate the habitat needs of the greatest number of wildlife due to multiple tree species, age classes, understory vegetation, and structure at a landscape scale; and (6) sustainable, based on the amount and type of regeneration present at the time of harvest or disturbance, or that develop within a reasonable amount of time after harvest or disturbance.”*

# **Furthering the Goals of the Highlands Water Protection and Planning Act**

## Sustainable Forestry Increases Water Yield

According to official figures, the water demand of those areas of New Jersey that receive their drinking water from Highlands water is expected to grow by about 17-18% of year 2000 levels by the year 2040 (NJ DEP, 1992). Without plans for additional reservoir construction or capacity increases, water supply managers will need to do more with current resources. While many different opinions have been offered to address this future need, the Committee would like to offer a brief digest of research regarding forest management and water yield. (Unless cited, information on water yield and water quality has been taken from material gathered by Paul Barten of University of Massachusetts, and Thom Kyker-Snowman of the Massachusetts Department of Conservation and Recreation's Division of Water Supply Protection.)

Reviews of scientific research show that 25% of forest canopy has to be removed in order to produce a measurable increase in water yield (Ice and Stednick, 2004).

In terms of basal area, 20% would need to be removed in order to affect a significant increase in water yield (Kochenderfer and Aubertin, 1975 in More and Soper, 1990).

Regarding forest thinning, water yields will return to pre-cutting levels usually by the 4<sup>th</sup> to 8<sup>th</sup> year.

Regarding successful forest regeneration harvests, water yields should return to pre-harvest levels within 10 years.

In the context of a sustainably managed watershed, increases in water yield due to harvesting will be mostly offset by decreases in water yield due to the resulting fast-growing young forest areas created from prior harvests.

Conversion of hardwoods to softwoods will result in a significant decrease in water yield, primarily due to higher water needs by conifers and the result of winter snow evaporation.

Regarding peak flows in areas of significant snow accumulation, homogenous forests and recent clearcuts may have higher peak flows, since the tendency would be for the snow to melt "all at once." In areas of heterogeneity, particularly in mixed hardwood/softwood forests and those with canopy openings, peak flows were desynchronized due to varying light and microclimate conditions on the snow (Verry et al, 1983; also Verry, 1972).

Turbidity, often associated with peak flows, is associated with extensive litter layer disturbance over a large scale, with improperly maintained roads, and poor stream structure. For example, SUNY's 1981 study of the Schoharie Reservoir estimated that while the road system represented 0.22% of the watershed area, roads were responsible for 11% of all erosion. The same study estimated streambanks to make up 0.44% of watershed area, but cause 21% of all erosion. If proper precautions are taken (see discussion of Best Management Practices below), water quality

impacts from logging are essentially non-existent (Stone et al., 1979). In addition, by protecting or establishing Zone 1 riparian forest buffers, foresters can depend on the woody debris, leaf dams, and tree roots needed to slow peak flows (Pallone and Todd, 1997).

Recommendation: *The Committee endorses active forest management as a means to improve water yield, while managing peak flows at acceptable levels.*

#### Sustainable Forestry Protects Water Quality

Regarding the effects of forestry on water quality, the scientific literature can be divided into two separate and distinct periods: before and after the establishment of Best Management Practices (hereafter referred to as “BMP’s”).

According to a 1975 report published by the U.S. Environmental Protection Agency (Arnold et al, 1975), sediment was identified as the most significant pollutant resulting from timber harvesting and that logging roads were the primary source. Such erosion caused increases in turbidity and nutrient loads. While this was generally known at the time, this study placed logging roads front-and-center in policy discussions regarding forest management.

As long as a buffer is left above the stream channel, harvesting has been shown to have no effect on temperature (Douglass and Swank, 1975). The cutting of trees (exclusive of forest roads and skidding) has been shown to have no significant effect on turbidity (Kochenderfer and Aubertin, 1975; Dyrness, 1965; Bormann et al, 1974).

The Federal Clean Water Act of 1987 prompted states to develop BMP guidelines to control non-point source pollution caused by silvicultural activities. In New Jersey, as with most other states, clear emphasis has been placed on the transport element (including stream crossings and road design and maintenance) as well as protection of forest canopy above the stream channel and above jurisdictional wetlands (referred to as “Streamside Management Zones”) (Cradic, 1995). The New Jersey BMP’s draw heavily from an EPA technical guide (1993). Given the remarkable public attention that forestry activities receive in New Jersey, it is a testament to the authors of the BMP’s, and to the foresters and the loggers involved that forestry activities following BMP’s have been able to be carried out successfully and without adverse environmental impact.

However, anecdotal evidence only carries so far. Now that most states have had BMP’s for more than ten years, important work is proceeding on two fronts: an analysis of their effectiveness, and an analysis of their successful implementation across individual logging operations and regional landscapes. One of the better examples of this process has been a four-year paired watershed study by the State of Maryland (<http://www.dnr.state.md.us/forests/mbmp/>).

In terms of secondary pollutants, much attention has been paid to nitrate by the DEP within the Highlands Region. Rapidly growing, young forest stands have the potential to temporarily capture nutrients that would otherwise end up in the water supply.

*“Compared to the ‘natural’ riparian forests studied in most existing research, managed riparian forests have the potential for*

*increased accumulation of nitrogen and phosphorous in biomass through both increased biomass production and increased foliar nutrient content. Trees can respond to nitrogen subsidy by both increased growth rates and luxury nitrogen consumption.” (Palone and Todd, 1998, Chapter 3, p. 8)*

While turbidity increased as the result of erosion, increases of nutrients, such as nitrate, can be caused solely by cover removal. That increase has been attributed to decomposition of residual wood material and to the reduction of uptake by tree roots (Vitousek, 1985).

Several factors control this response. For example, specifying the amount of cover removed over an entire watershed at one time can have an effect, with more cover retained resulting in less nutrient loss (Bormann et al, 1968). Location of the site within the watershed also mattered, with lower areas causing faster nutrient input, but with higher areas causing more nutrient loss (Martin and Pierce, 1980). The role of soil type and depth has also been extensively studied. The most appropriate study to the NJ Highlands found that soils that are shallow to bedrock are susceptible to nutrient loss (Williams and Mace, 1974), however it would be logical to assume that this loss would be reduced or eliminated based on the presence and vigor of advance regeneration. Such timing of the regeneration response, forest type, and slope were also shown to play a role.

However, this “impact” must be placed in the proper context. For nitrate measured as nitrogen, drinking water is not to exceed 10 mg/L. During a 1990-95 study of streams in 85 sites across the nation a median value of nitrate measured as nitrogen of 0.087 mg/L was generated. Due to deposition rates of atmospheric nitrogen, concentrations and yields of nitrate were higher in the northeast and mid-Atlantic coastal states. Specifically, nitrate measured as nitrogen exceeded 0.6 mg/L in three basins (Clark et al, 2000). Given Hornbeck, et al’s study (1975) showing that a clearcut of an entire watershed forest produced a six fold increase in nitrate levels, the resultant nitrate levels would still be less than half of the drinking water standard. In fact, a Highlands-specific experiment should show even less of a nitrate impact, given the coarse nature of the soil in the aforementioned study area.

One critical flaw in these paired watershed studies is the short duration of the study period. As a result of the application of BMP’s based on sound and proven science, harvest operations currently do not affect turbidity, dissolved oxygen or temperature, and the impact on nitrate, while statistically significant, is of negligible concern to a watershed manager. However, the unmanaged control watershed is not being similarly judged for effects of events related to, or exacerbated by, unmanaged conditions. There is a need for a long-term study regarding water yield and water quality from managed and unmanaged watersheds.

Observing the hypothetical forest from a further view, we should examine the hydrologic cycle and the inputs and outputs to the forest ecosystem. Water enters a watershed from precipitation. Water leaves the system through evapotranspiration and leakage (surface and subsurface water flow and groundwater recharge). The water may also be temporarily stored. Atmospheric deposition of chemicals has been understood for years. Consider their entry into the system and temporary storage within a tree. If the tree dies and decomposes, those chemicals will enter the

water system. However, if the tree is harvested, the chemical is removed from the watershed system, and will not enter the water supply. While several factors reduce the importance of trees and plants as nutrient sinks, the temporary storage is real, as is the ability to remove that biomass from the system.

It has been postulated (by Barten and Kyker-Snowman, amongst others) that water yield and certain aspects of water quality may fluctuate dramatically in an unmanaged forest over a long-term, while water yield and quality will remain stable in a forest managed in adherence to BMP's. The reasoning behind this hypothesis is that managed forests are periodically thinned to near-optimum growing conditions, the individual trees are maximizing rates of photosynthesis, diameter growth, root growth, energy storage, improving taper, and producing secondary chemical compounds to increase resistance to fungus and other damaging agents. Unmanaged stands, to some extent, have a tendency to develop high levels of stocking/relative density whereby too many trees are competing for the same growing space, and the competition is slowing the growth, and thus health, of the codominant trees within the forest. This situation may increase the probability of large-scale windthrow, or increased mortality from damaging agents.

Such overstocked stands will have a minimum of sunlight reaching the forest floor. Thus little advance regeneration would be available in the event of a severe disturbance such as windthrow, or severe insect infestation. Given such a catastrophe, effects on water yield and water quality would mimic the effects shown as if the area had been harvested (Tamm 1991; Parsons et al, 1994). However, in an unmanaged forest, the potential could exist, depending on the damaging agent, to have a complete loss of a watershed forest. In a managed forest complete with multiple age classes and advance regeneration, losses could be limited, depending on the damaging agent, to mature and overmature stands. In the event of their loss, the advanced regeneration present could ameliorate some of the negative water yield and water quality effects.

**Recommendation: *The Committee endorses active forest management as a means to consistently protect and perpetually provide high-quality drinking water, particularly in comparison to residential land uses and lack of forest management. In addition, regulation above and beyond current (1995) BMP's are unnecessary, and would neither be supported by science, nor have a legal basis according to Section 30a(7) of the Act.***

#### Sustainable Forestry Promotes Wildlife Through Habitat Creation

Temporary forest canopy openings are caused by various natural processes including wind events, ice storms, fire, and insect and disease outbreaks. Such disturbances are neither good nor bad, but merely inevitable. Silvicultural techniques seek to simulate these natural processes in order to release or stimulate the growth of the next cohort of trees to fill that canopy opening. By repeating this process over time in increments across a large forest, a mosaic of various age classes and ecological characteristics is developed, which should serve the habitat needs of the largest number of fauna and flora. Ecological integrity is enhanced by biodiversity.

For the past decade or two, the task of producing forests with various age classes and ecological characteristics has been indefinitely postponed by public land managers within the state. During

the same period, parcelization (or reduction in the average size of ownership) has increased on private lands. A review of woodland properties within the Highlands was prepared in 2004 by Gracie and Harrigan Consulting Foresters, Inc., based on 420 Farmland Assessed properties. They found that the median amount of non-appurtenant woodland owned was less than 45 acres per property. This was validated by Frank Hennion of the NJ Forest Service, who kept tract of property acreage on Farmland Assessment inspections in the northern region for an entire year (Hennion, pers. comm.).

Thus, even-age regeneration techniques such as clearcuts, seed-tree harvests, and shelterwood harvests have dramatically decreased on private lands, in favor of techniques more appropriate for smaller ownerships, including group selection or individual tree selection. Habitat needs of certain species which require forests aged 0-20 years may not be met under these systems. In addition, regeneration of oak, prized by wildlife because of its acorns, is very difficult under group selection, and minimal under individual tree selection.

Specifically, we are concerned about the results of Rodewald and Abrams, that “a regional change from oak- to maple-dominated forests may strongly affect avian community structure and populations of some common bird species associated with eastern deciduous forests” (2002). Further,

“Our study is the first to provide evidence that a regional shift in forest composition from oak- to maple-dominated forests may reduce species richness and abundance within forest bird communities and may negatively influence certain species. In particular, long-distance migrants, residents, and bark-gleaning species may be the most affected because of their foraging strategies.”

Much of the poor management on public lands stems from the fixation of some in the preservation community with poor land management practices in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries, before the acceptance of scientific forestry in America. Such a view is best illustrated by the current official policy of the Sierra Club regarding commercial logging on federal land:

*“The Sierra Club support[s] protecting all federal publicly owned lands in the United States and advocate[s] an end to all commercial logging on these lands.” (adopted April 20, 1996)*

The “wilderness” approach to land management is (1) inappropriate for the most densely populated state in the nation; (2) disregards the need of human society for renewable resources; (3) ignores the voluminous scientific data bank that has been generated over the last 90 to 100 years; (4) refuses to accept adaptive management strategies for natural resources and (5) rejects the wise management of our sustainable temperate forests at the expense of much more fragile, tropical ecosystems throughout the world. Boilerplate prescriptions of severely reduced management of the forest resource which has taken hold of the State Parks and Forest system, the Division of Fish and Wildlife, and the Natural Lands Trust, ignore the consequences. That lack of management, as shown by the Rodewald and Abrams study, is having a negative effect on neotropical migratory songbirds, including the wood thrush and rose-breasted grosbeak.

As parcelization continues, active management of public lands may soon be the only appropriate avenue to create such habitat in the Highlands region. Such forces led the Nature Conservancy to recently endorse plans by the Indiana Department of Natural Resources to increase the amount of regeneration harvests on public land, given certain conditions are met.

*“It is widely accepted that oak-hickory forests throughout Indiana are declining in abundance in the absence of disturbance – being replaced instead by a beech-maple forest. Since we no longer have the ecologically important process of fire on the landscape to promote oak, careful forest management, including the disturbance caused by timber harvesting, can create conditions needed to ensure oak continues to be abundant in the forest.” (in Wilent, 2005)*

The issue has been raised that certain creation of edge habitat can result in the decrease in reproduction and nesting and increased predation of area-sensitive songbirds (Sullivan and Brittingham, 1994; Wilcove, 1988). However, many forests within the Highlands already contain multiple forest stands of varying ages, due to differing periods of forest establishment from clearing for charcoal, the abandonment of marginal agricultural lands, and past forest regeneration harvests. For species that require unbroken canopy of a certain extent, the Committee recommends that forest planning reflect a minimum requirement, not an absolute requirement that all forest somehow ceases development for the benefit of a small number of species, to the detriment of other species.

In tackling this same question in Indiana, the Nature Conservancy explained: “Obviously nesting songbirds could be directly impacted in areas harvested during the nesting season of late spring and early summer. But long-term habitat manipulation through harvesting or lack thereof almost certainly has more important implications.

“There is agreement among biologists that many of our songbirds are in decline. The reasons are not fully clear but habitat probably plays a very important role. Some of these declining songbirds such as the wood thrush, hooded warbler and eastern wood-pewee require older, mature forests to successfully nest. Other declining birds such as woodcock, ruffed grouse, yellow-breasted chat and eastern towhee require very young, wooded thickets to survive.

“More birds in this latter group have shown significant declines over the last few decades than their mature forest counterparts. In 2001 W.C. Hunter and his co-authors published data in an issue of the Wildlife Society Bulletin under the title, *Conservation of Disturbance-dependent Birds in Eastern North America*, showing that approximately 70% of birds associated with shrub-scrub habitats in the eastern US were undergoing declines. Biologist Frank Thompson and others in their paper, *Status of Neotropical Migrant Landbirds in the Midwest: Identifying Species of Management Concern*, point out that ‘Birds in shrub-sapling habitats [are] of high management concern probably because their habitat is more spatially and temporally limited than older forest habitats.’

“Interestingly, some birds require both habitat types such as the whip-poor-will and worm-eating warbler. Birds in this group sometimes nest in older forest, but forage in younger thickets. As

such, it stands to reason that there must remain on the landscape adequate areas for all these habitat specialists to thrive. Areas now designated for long-rotation (100-150 year old forest) must remain long-rotation, but in other areas proper timber harvesting can create the very young forests needed as well.

“In a 1993 publication of *Current Ornithology* a paper entitled, *Population trends in grassland, shrubland, and forest birds in eastern North America*, Robert Askins supports this need to have both young and old forests for bird conservation, ‘The emphasis on maintaining representative tracts of all natural forest stages would insure habitat exists for early-successional species.’ He goes on to point out, ‘New approaches to forestry, in which logging is designed to simulate the effects of natural disturbances such as storms and fires . . . hold promise for shrubland specialists.’

“The *Partners in Flight North American Landbird Conservation Plan* published in 2004 (Rich et al, 2004) identified several conservation issues for the Eastern Avifaunal Biome. Among these was ‘Maturation of forest throughout the East has resulted in lack of successional habitats as well as reduction in disturbance-generated forest structure such as shrubby understory. These conditions are exacerbated by lack of forest management on public lands and by overbrowsing by white-tailed deer.’

“Finally, Dr. Rodewald cites a recent study in the forests in Pennsylvania which revealed ‘total abundance and species richness of birds was 50-200% greater within oak-dominated stands than in maple dominated stands in at least one season.’ She concludes, ‘Moreover, the distribution, abundance, and behavior of numerous wildlife species, ranging from bears to warblers, are linked to oaks. So when faced with compelling evidence that oaks will be less abundant in many forests within the next several decades, biologists and land managers need to carefully consider how current management approaches will affect the persistence of oak forests and their associated biota. Ultimately, management scenarios that discourage oak regeneration may negatively impact some wildlife species and, at the very least, are expected to influence wildlife community structure and interactions among species.’

“In short, we need to recognize that there are tradeoffs to forest management as well as forest preservation. Some birds will benefit from one and not the other, therefore it is important to plan ahead to get a good balance of habitats.” (Nature Conservancy, 2006)

The Committee concurs with the Nature Conservancy, but asserts that any “tradeoff” or negative impact could be minimized, if not eliminated, using harvest scheduling models and protocols that accept constraints such as conservation of core forest habitat needs, wetlands, scenic considerations, etc. Further, given the transitory edge effect caused by successful regeneration harvests (in comparison with the permanent edge effect caused by land clearing/land use change), a significant amount of the impact on “potential” core forest within that tract would be eliminated within ten years (Lichstein 2002). Harvest scheduling models have been developed to accommodate not only habitat concerns such as these, by also BMP’s and scenic considerations (Bevers and Hof, 1999; Hoganson and Borges, 1998; Synder and ReVelle, 1996).

Such young forests are critical habitat for a variety of wildlife including ruffed grouse (Sargent and Carter, 1999), golden-winged warbler, bobwhite quail, pheasant, bobcat (NJDEP, 2004a), among other species. Management for ruffed grouse entails the creation or improvement of four different types of habitat: breeding, nesting, winter, and habitat for hens with broods. Grouse can live their entire lives in an area of 40 acres or less, if all four habitats are present in adequate quality. However, in established woodlots, this would involve the regeneration of between 5 and 20 acre blocks of forest at a time, up to 40 acres if the block were irregularly shaped (Fearer, 1999).

Therefore the Committee recommends that the Regional Master Plan specifically address the lack of forest aged 0-20 years. *Regenerating Oak Dominated Stands: Descriptions, Predictive Models, and Guidelines* (Gould, 2005) serves as an excellent guide for determining outcomes based on present inventory data. If at all possible, those data collection methods and predictive models should be employed prior to harvest in order to greatly increase the probability of regeneration success, given factors such as deer impact and competing vegetation. We further recommend that invasive species within harvest sites be controlled during and immediately after harvest. Where necessary, artificial regeneration of forest stands is addressed by Gould. References on mechanical, chemical, and biological treatment on invasive species are too numerous to cite, however, the NJ Forest Service has distributed and received positive comments on the *Southeast Exotic Pest Plant Council Invasive Plant Manual* (2003).

The Gould study also specifically addresses the problem of deer browse on successful forest regeneration. By applying the results of a pre-harvest regeneration inventory to predictive models in Gould, a land manager would therefore be able to predict regeneration success without directly measuring the deer density in that area. This is of tremendous benefit to the Highlands region, where deer densities can vary dramatically within several square miles based on land use and presence and activity of hunting. The Gould models, although Pennsylvanian, are appropriate to NJ Highlands forests, based on similar average annual minimum temperature (USDA Hardiness Zone), rainfall totals, soils, and cover type.

***Recommendation: The Committee acknowledges the benefit to biodiversity created by the presence on multiple age classes in a forest containing many tree species. Thus, we recommend that the Regional Master Plan contain a vision of actively managed private and public forests as being beneficial to the greatest number of fauna and flora. We further recommend the promotion of established scientific research to enhance the success of regeneration harvests.***

#### Sustainable Forestry Improves Understory Flora

Given the persistent overpopulation of deer within the majority of the NJ Highlands region, much attention has been paid to lack of advance regeneration (discussed above) and impact on other understory plants and shrubs (Tilghman, 1989; McShea and Rappole, 2000). Dependent on species, the effects of exotic invasive plants are usually secondary, albeit significant concerns.

Early adopters within the Highlands region have now had areas of deer exclusion fencing in place for more than 5 years. Although the observations of these areas has been previously

unpublished, tree and shrub seedling growth within deer exclusions have been noted at several thousand stems per acre, compared to less than 10 stems per acre outside of the fence (Harrigan, pers. comm.). Control and maintenance of exotic invasive plants are necessary if the objectives of the owner for such exclusion include restoration or conservation of native plants.

As was mentioned previously, effective deer densities can vary dramatically within several square miles based on land use and presence and activity of hunting. Certain areas have a healthy and developing understory that can be favored with the reduction of overstory stocking, individual tree selection, and/or group selection. Some have referred to these activities as creating “light gaps.”

While certain advocates and landowners seek for the total elimination of exotic invasive plants, it is crucial to recognize that other landowners have different objectives and limitations. For some landowners, such otherwise undesirable plants may serve a specific purpose. Other landowners may seek a balanced approach for the gradual control of exotic invasive plants, and the planting of native species. It is likely that policymakers will need to accept these non-native plants as a significant ground cover component in our future forests.

In addition, many landowners simply do not have the funds available for fencing, exotic invasive plant control, and other understory improvement. While some claim that the tax benefits of the Farmland Assessment program save forest land owners “tens of thousands of dollars” each year, no substantiation of this figure exists, and the Committee understands the savings to be considerably overstated by some.

In 1999, it had been estimated that Farmland Assessment, on certain properties, could result in a 94% reduction in the assessed value of land proven to be actively devoted to agriculture. As a result of the dramatic increase in land values (and thus assessed values) in the period 2001 to 2004, this pushed the reduction to more than 95% for certain farmland, particularly in municipalities with high property taxes. Assessed values of homes, non-agricultural buildings, and landscaping are not affected by Farmland Assessment.

Assuming the median 45 acre woodlot is Farmland Assessed at \$120/acre (State Farmland Evaluation Advisory Committee 2004), and that the total property tax rate is 2.3% (tax ratio weighted for 100%), property taxes on the woodland would be \$124.20. Assuming 95% reduction in normal property taxes, the gross tax savings would be about \$2,360/year. However, when adjusting for reasonable management and woodcutting expenses, the net savings would be reduced to about \$1,060/year. This annual savings is actually quite small compared to the cost of establishing one acre of deer exclusion fence (840 feet of perimeter @ \$4 per foot = \$3,360), cost of chemical control of one acre of exotic invasive plants (\$600/acre according to maximum cost-share allowances of the federal WHIP program), and planting an acre of native shrubs (400 seedlings @ \$0.95/seedling + \$500 labor = \$880).

Expected savings under Farmland Assessment will vary dramatically based on the assessed value of the unimproved land, and is site specific. The devaluation of unimproved land is also expected to reduce savings under Farmland Assessment. Some evidence of this process is beginning to be seen in northern Passaic County.

Recommendation: *The Committee acknowledges the potential to improve forest understory flora, and thus biodiversity, through thinnings and harvests, deer exclusion fencing or effective hunting, control of exotic invasive plants, and supplemental planting of native plants. To the extent possible, the Council should create incentives for fencing, exotic invasive control, and fencing.*

#### Sustainable Forestry Restores Damaged Ecosystems

Forest overstory can be damaged by any number of natural or anthropological causes, including wind, fire, insects and disease, air pollution including atmospheric deposition, mining, commercial clearcuts (does not include silvicultural clearcuts or true silvicultural practices), and land use change. Much of the given damage will be site-specific, depending on the health of the original stand, the severity of the disturbance, the frequency of the disturbance, and site-specific factors such as soils, slope, aspect, cover type, presence of invasive plants, etc. Certain protocols are available to foresters, landowners, and policy makers in order to guide restoration efforts. Since silvicultural systems seek to mimic natural processes, it should be no surprise that many restoration strategies are based on already existing forestry practices.

Aggressive diameter limit cuts, sometimes referred to as high-grading or commercial clearcuts (not to be confused with silvicultural clearcuts or true silvicultural practices) in some instances can unintentionally mimic wind events. A review of guidelines and recommendations based on site conditions is provided in *Diameter-Limit Cutting and Silviculture in Northeastern Forests: A Primer for Landowners, Practitioners, and Policymakers*. This guide, published by the USDA Forest Service (Kenefic and Nyland, 2005) incorporates research of the last fifteen years into a straightforward 13-page guide. Although land managers would need to adjust for site-specific factors, such as deer densities and exotic invasive plants levels, these matters were previously discussed, and are easily incorporated.

Reforestation of mining sites can be a difficult problem, particularly when there is a lack of funds available for proper site preparation and tree planting. While this is not the case for properly bonded surface mining operations, some abandoned sites exist, particularly small scale quarries and sand and shale pits that have not adequately reforested. One of the better resources for land managers is from Virginia (Burger and Zipper, 2002). That guide discusses critical issues such as soils and fill, ground cover for erosion control, tree species and seedling selection, and economic considerations. It does not, however, discuss the planting of woody understory plants, and tree species selection in the Highlands region would be geared more toward hardwoods. That guide would also be useful for planning the reforestation of recently abandoned marginal agricultural lands.

The effects of insect and disease agents are varied and specific. Two current problems are of specific concern to the NJ Highlands. Hemlock wooly adelgid, first introduced to the eastern US in Virginia in 1951, has completely infested the Highlands region, and perhaps 1/3 of the native range of eastern hemlock. Although biological control is underway (led by the NJ Department of Agriculture's Philip Alampi Laboratory), dominant and codominant hemlocks in New Jersey may not survive. *Eastern Hemlock Forests: Guidelines to Minimize the Impacts of Hemlock*

*Woolly Adelgid* (Ward et al, 2004) is the most current and pertinent guide to ecosystem restoration. The guide focuses on the varying responses on hemlock trees to the adelgid based on slope, aspect, and soil moisture, and group selection harvests and patch clearcuts to facilitate the growth and/or planting of other native softwoods. Those softwoods, such as white pine, would fill the ecological niche that hemlock serves for various bird species such as the Acadian flycatcher and the black-throated green warbler.

Regionally, gypsy moths have been making a resurgence. This summer, a mild to moderate infestation of gypsy moths may occur in portions of the NJ Highlands. This is part of a regional epidemic that has been moving south within New York for several years. After successive years of gypsy moth defoliation, many oak trees, particularly chestnut oak and white oak, will be killed by pests such as root-lace fungus and two-lined chestnut borer. Some sites, including ridge tops and higher elevations may experience significant mortality. Damage to the forest will be site-specific and may resemble a major wind event or a commercial clearcut, discussed above.

Fire, although instrumental in the development of the present oak-dominated forests of the Highlands region, has ceased to be a regular or significant presence in Highlands forests. Given the population of the Highlands, this is unlikely to change. Restoration after major fire, and other catastrophic forest restoration protocols can be found in the USDA Natural Resource Conservation Service's *Electronic Field Office Technical Guide* (<http://www.nrcs.usda.gov/Technical/efotg/>).

It is important to recognize the difference between natural and silvicultural disturbances such as wind, fire, mortality from insects and disease, regeneration and selective harvests, and long-term disturbances such as change in land use. While natural and silvicultural disturbances will recover, sometimes with the active help of land managers, a change in land use will only revert to forest once that use has been abandoned.

***Recommendation: The Committee acknowledges the range of forest restoration methodologies (listed above) that are based on sustainable forestry principles. While very minor modifications for NJ Highlands-specific issues will need to be made, these sources provide knowledge that should lead to the successful restoration of ecosystems using silvicultural methods.***

#### Bringing the Benefits of Sustainable Forestry to Public Lands

A management plan serves as the cornerstone for the active stewardship of any land. The management plan serves to record and codify the objectives of the owner, the assessment of resources at a given time, and current constraints, restrictions, and regulations. The management plan recommends a regime of activities designed to meet the stated objectives of the owner, in accordance with the most recent and applicable science available.

Every public lands manager has a real obligation to meet the stated objectives of the governing body. The management plan element and/or an objective of the Highlands Preservation Area (and those municipalities who choose to “opt in”) is stated in Section 60 of the Act:

*“Section 60 of the Act amended Section 19b(8) of P.L.1975, c.291 (C.40:55D-28) to read: ‘A conservation plan element providing for the preservation, conservation, and utilization of natural resources, including, to the extent appropriate, energy, open space, water supply, forests, soil, marshes, wetlands, harbors, rivers and other waters, fisheries, endangered or threatened species wildlife and other resources, and which systematically analyzes the impact of each other component and element of the master plan on the present and future preservation, conservation and utilization of those resources.’”*

Given the turnover of public land managers, specifically superintendents within the DEP State Park Service, the management plan would serve to provide continuity of vision and activity. In addition, for state lands of DEP Division of Parks and Forestry and Division of Fish and Wildlife, the plan and its recommended actions would be subject to review by agencies in charge of resources protected by law. In this way, conflicts would be resolved during the planning process instead of during the implementation phase.

While forest management for wood products would not be appropriate for some public holdings, specifically small, actively managed recreation areas, and those properties dominated by wetlands, forestry for benefits, such as water yield, forest health, wildlife, urban/community forestry and public safety would be appropriate on most properties. Management plans would have the direct and obvious effect of preventing haphazard and possibly environmentally damaging actions on lands owned by the public.

Funding for the initial development of the management plan is often the toughest sell for any landowner, public or private. While forests held by land trusts or other private entities would qualify for partial funding of creation of a management plan under the USDA Forest Service’s Forest Land Enhancement Program (administered by the NJ Forest Service), public entities are specifically prohibited under this program.

The Committee believes that a management plan on public lands could likely pay for itself simply by preventing haphazard and damaging activities. Where appropriate and in accordance with a management plan, funds could also be generated from sales of forest products from a given forest. Section 60 of the Act appears to require conservation planning, however it is not clear whether the Council will be providing cost-share or other assistance to public entities such as municipalities and counties who own land. Such management plans can be completed through public and private partnerships.

**Recommendation: *The Committee believes that ownership of land by a state, county, municipal, or water management entity obligates that entity to properly steward that resource. The Committee further finds that the majority of publicly owned land within the NJ Highlands region has not been properly planned for or managed in accordance with a current management plan. The Committee recommends that all currently owned public and water supply lands within the NJ Highlands be placed under management plans within the next ten years that address water supply, forests, soil, wetlands, open waters, fisheries, endangered or***

***threatened species wildlife and other resources. All lands acquired hereafter should also be placed under a management plan. The Committee recommends a cost-share or other program to assist public entities with the funding necessary to produce management plans.***

Verifying the Benefits of Sustainable Forestry on Lands of the Department of Environmental Protection

Currently, DEP Division of Parks and Forestry and Division of Fish and Wildlife are working on a pilot program within the Pinelands region to draft land management plans (at a landscape level) using modern specifications. It is expected that once the initial pilot plan is drafted and reviewed, that it will become a template for the proper resource planning on state lands and that process will continue across all DEP-owned lands. Upon completion of management plans for 50% of the acreage owned by Division of Parks and Forestry and Division of Fish and Game, DEP should investigate third-party verification of sustainability of resources on its lands.

Since the proper management of public land is so crucial, and since the DEP is planning significant land acquisitions within the Highlands, this verification would be the last line of defense for the public interest. In addition, by having third-party verification, New Jersey would align itself with the standard practices of New York, Pennsylvania, Maryland, Massachusetts, Maine, Michigan, Minnesota, Wisconsin and North Carolina. Such third-party verification would further insulate decision-makers from political pressures and focus attention on current and pertinent scientific information and its appropriate application.

Once such third-party verification system, Sustainable Forestry Initiative (SFI) is a comprehensive system of principles, objectives and performance measures developed by professional foresters, conservationists and scientists that combines the perpetual growing and harvesting of trees with the long-term protection of wildlife, plants, and soil and water quality. To ensure forests are protected, the American Forest & Paper Association (AF&PA) developed the SFI program to document the commitment of their members and the program's licensees to keeping forests healthy and practicing the highest level of sustainable forestry.

Regarding its ability to properly verify sustainability:

*“Keeping our forests healthy is important. Healthy forests will continue to provide the wood and paper products that are vital to all of us while also ensuring that we have forests and wildlife for future generations of Americans. The SFI program was adopted by AF&PA in 1994, and as a testament to the association's strong commitment to the goal of sustainable forestry, participation in the SFI program is a condition of membership for AF&PA. Since 1994, AF&PA has asked 17 members to leave the association for failing to meet the SFI Standard. There are currently over 150 million acres of forestland in North America enrolled in the SFI program, making it among the world's largest sustainable forestry programs. The SFI Program is overseen by the Sustainable Forestry Board (SFB), an independent 501(c)3 organization, which is responsible for maintaining and enhancing the SFI*

*Standard and verification procedures. The SFB has 15 members, two-thirds of which come from a wide range of non-industry interests, including: environmental/conservation organizations; public officials (state and/or federal agencies); professional/academic groups; logging professional; non-industrial landowners. The remaining five representatives on the SFB consist of AF&PA members.”*  
(<http://www.aboutsfi.org/about.asp>)

At this point, third-party verification is not recommended for private lands within the Highlands. The average size and management intensity would qualify the vast majority of private forestland as “small, low-intensity private forests” in the eyes of the third-party auditors. Such properties are specifically not recommended for verification by the auditors themselves. For example, the smallest SFI-certified forest is the 4,300-acre Pack Forest owned by the University of Washington.

For those private forest landowners within the NJ Highlands region seeking third-party verification, the Tree Farm program of the American Forest Foundation provides free verification services. In fact, approximately 254 forest land owners (24,865 acres) are already certified or candidate-status “Tree Farms” under that program, in the eight county Highlands area. However, the program’s 10 acre minimum woodland acreage requirement would prevent many, but not most Farmland Assessed forest land owners in the NJ Highlands Region from participating.

***Recommendation: After 50% of DEP-owned lands are placed under comprehensive management plans, the Committee recommends that the DEP investigate third-party verification of sustainability of its practices.***

#### Protecting Forestry from Duplicative Regulation

Section 14a of the Act states:

*“Within nine to 15 months after the date of adoption of the regional master plan or any revision thereof, according to a schedule to be established by the Council, each municipality located wholly or partially in the preservation area shall submit to the Council such revisions of the municipal master plan and development regulations, as applicable to the development and use of land in the preservation area, as may be necessary in order to conform that with the goals, requirements, and provisions of the regional master plan...”*

Many municipalities within the NJ Highlands region have land use ordinances or zoning ordinances that impact tree cutting and/or forestry in general. A significant number of these ordinances regulate forestry activities and predate DEP Forest Service Best Management Practices (previously discussed). Thus, the provisions of these ordinances that regulate forestry are duplicative and unnecessary. The majority of tree cutting ordinances within the NJ

Highlands specifically exempt forestry activities in accordance with a forest management plan approved by the State Forester.

However, a limited number of municipalities have taken a severe, almost personal affront to any forestry activity regardless of state approval or appropriate scientific or other reasonable justification. Kinnelon Borough had been a prime example of this process, having a zoning ordinance that effectively “zones out” agriculture and forestry. However, in recent months the Borough has ceased to pursue alleged violations, having been consistently rejected when matters were addressed in the Morris County tax court.

The Borough of High Bridge has a strict permitting process that involves the Borough Engineer. In addition, exorbitant fees are assessed (\$5,000 would be assessed to cut 125 trees, regardless of health or physical defect) for a review process that adds no value, nor has any scientific basis.

Section 30a(7) of the Act states:

*“The following are exempt from the provisions of this act, the regional master plan, any rules or regulations adopted by the Department of Environmental Protection pursuant to this act, or any amendments to a master plan, development regulations, or other regulations adopted by a local government unit to specifically conform them with the regional master plan... (7) an activity conducted in accordance with an approved woodland management plan pursuant to section 3 of P.L.1964, c.48 (C.54:4-23.3) or the normal harvesting of wood products in accordance with a forest management plan approved by the State Forester”*

**Recommendation: As the Highlands Council reviews municipal and county master plans and ordinances, it should look specifically to add Section 30a(7) as an exemption to all existing tree cutting ordinances, in order to protect farmers and forest landowners from unnecessary and duplicative regulation and fees. Similarly, the Council should strike down any attempt by a municipality or county to regulate forestry or agriculture as a zoning matter. We further recommend striking any ordinance that does not allow deer exclusion fencing in accordance with a forest management plan.**

#### Continuing Sustainable Forestry on Preserved Private Lands

A great number of flawed standard conservation easements/restrictions exist within the NJ Highlands region. Some conservation easements prohibit the disturbance of leaf litter, regardless of proximity to a stream channel or size of the disturbance. Some conservation easements prohibit the cutting of any vegetation, alive or dead. Other easements specifically prohibit agriculture or forestry, outright.

Given the role of the Highlands Council and the Regional Master Plan in helping to facilitate land purchases, purchases of development rights through TDR, and land preservation through purchase of conservation easements, the Council should seek to address consistency in regards to forestry in those easements and restrictions. Further, the Highlands Council and staff should

seek to educate land trusts, the staff of the DEP Green Acres program, and policymakers regarding the positive benefits of forestry on water supply, wildlife, and other resources, as detailed and cited above.

Further, to the extent possible, properties with or under future consideration of a conservation easement/restriction should be encouraged, if not required to be placed under a forest management plan. As many land trusts and municipalities know, onerous conservation easements can be expensive to maintain and properly administer. Ideally, a property with a conservation easement/restriction would be visited periodically to determine continued compliance with the easement/restriction. As the framework already exists within the woodland portion of the Farmland Assessment Act for a review to occur, land under a conservation restriction should be encouraged to have a Forest Management Plan, and be permitted to participate in the New Jersey Farmland Assessment program. Under such a program, a woodlot would be visited by a forester at least once every other year, and would be reviewed periodically by the NJDEP's Forest Service (once every three years). Easement maintenance could be as easy as contacting the forester and obtaining updated property maps / aerial photos. By encouraging forestry in accordance with a state-approved management plan, the land trust or municipality would be able to significantly reduce its costs.

**Recommendation: *The Committee recommends the standardization or improvement of conservation easements and restrictions funded by, approved by, or relating to the Highlands, in order to allow forestry in accordance with Section 30a(7) of the Act. We believe that land managed in accordance with the Farmland Assessment relieves the easement holder of a large portion of the costs of ensuring compliance with the terms of the easement. As conservation easements become less costly to administer, an increasing market share of preserved lands should be in the form of conservation easements. Since conservation easements are less expensive than purchasing land in fee simple, this will increase the amount of land able to be preserved, given limited funds.***

## **Preventing major errors within the Regional Master Plan**

### Fatal Flaws within the Landscape Project

Due to the compressed time period under which the Council, staff, Technical Advisory Committees and contractors are working under, the potential exists to make major errors should due diligence not be carried out in examining the tools that are being used to carry out the purposes of the Act. The most obvious example of such a cause of major error is the DEP Endangered and Nongame Species Program's "Landscape Project," which as of this point, has been accepted without any review whatsoever. The underlying basis of the Landscape Project is critically flawed and represents an unreasonable and arbitrary measure to determine the possible presence of protected fauna.

With the exception of the wood turtle, bald eagle foraging, and urban peregrine falcon GIS data layers, the Landscape Project represents a major step backwards for the DEP in regard to the accurate reporting of threatened and endangered species to land stewards. Previously, records of individual sightings were recorded on a master map, and upon submission to the Natural Heritage Database, information would be released regarding sightings on the property and within ¼ mile of the site. Using information such as the date of observation of the subject, the land steward would be able to make informed decisions. Since results of the Landscape Project, which are based on contiguous land use type rather than the actual presence of species, were substituted for the previous method of determining possible presence of T&E fauna, most reasonable land managers within our acquaintance now mistrust the results generated.

Given a large, contiguous forest, a reported and verified sighting (as defined in Niles et al, 2004) of a protected species will cause a search anywhere within that same contiguous forest, and possibly adjacent forests, to register a positive result. There is clear bias toward large, contiguous forests that is unsupportable. Is it reasonable to assume that because a red-shouldered hawk is reported in central Hardyston Township, Sussex County, that that same species is present in southwestern Rockaway Township, Morris County?

Some protected species are limited geographically. It would be unreasonable to assume that a longtail salamander population near the Delaware River in Hardwick Township, Warren County would be able to disperse into Blairstown Township, Warren County due to the presence of the Kittatinny Ridge and its ~1,000 foot elevation change. However, the methodology of the Landscape Project suggests otherwise. While at least one species (wood turtle) has been separated out from the rest of the results to reflect this obvious error in methodology, other species have not.

The underlying basis for determining the presence of protected species is arbitrary and unreliable. Although the methodology within Niles et al details the quality control features regarding acceptance of new sightings, the quality control of historical records is atrocious. All that is needed is a map accurate to within one degree (maximum error of about 128 feet) and a last observation date of 1970 or later. What this means is that important decisions may be made based on records of sightings of protected species that may be thirty-five years old. Further, the

Committee questions the ability of the protocol for accepting or rejecting species sighting reports to avoid accepting politically-motivated false species reports by trained participants.

It is not clear what standards were used in 1970 to screen reports before being entered into the Natural Heritage database or similar systems. Further, the reliability and knowledge of the observer must be substantiated in order for a proper siting to be entered into the Landscape Project/Natural Heritage Database. It is unclear what standards were used to screen qualified observers in 1970 or today.

Since a healthy forest is dynamic, the ecosystem that is presently in existence may no longer meet the habitat needs of the reported protected species. Were a grasshopper sparrow observed in an abandoned farm field in 1970, that area may now be a closed canopy forest.

As is well-known, many areas in the state have now been developed. It is unclear what became of records of protected species once observed on sites that are now developed.

It is possible that a record of an observation made in 1970 would still be considered accurate even if the species could not be located at a later time. If an observation is made in 1970, and negative observations are made in 1980, 1990, 2000, and 2005, one would consider it unreasonable that the 1970 observation is still valid.

The selection of the year 1970 is completely arbitrary given a dynamic, growing forest resource. To the reader, it would seem that in selecting 1970, the DEP is attempting to place some sort of quality control on the historical sighting. However, in selecting 1970, the DEP is ignoring the primary purpose of the Landscape Project, namely identification of "potential habitat." The usual and customary period for reevaluating forest resources in New Jersey is 10 to 15 years (NJAC 18:15-2.10). Therefore, all sightings prior to 1990 should be reassessed for presence of protected species. If a forest interior bird is reported in an area of the Pinelands in 1980, and in 1990 that area suffers a catastrophic wildfire, and the forest does not regenerate successfully, is that sighting still valid?

In the 2004 Report, it is stated that the maps and methodologies of the Landscape Project have been peer-reviewed by eighteen different persons, including many holding advanced degrees. It is unclear whether or not these same people would approve of the Landscape Project in its current state as a regulatory tool. If so, why were the glaring errors and omissions mentioned above allowed to pass from the previous version of the Landscape Project to the current version? Although this Committee respects a great many of the persons listed as having reviewed the Landscape Project, the process involved does not constitute a scientific peer review process. In a normal scientific peer review process, qualified reviewers are selected by a disinterested party.

Furthermore, some of the recommended uses of the Landscape Project have no reasonable justification. For example, supposing that a patch of forest comes up as positive for the red-headed woodpecker. As a result of the "existing regulatory constraints," all streams that intersect with that patch of forest now have a 150 foot buffer instead of a 50 foot buffer. Red-headed woodpeckers do not have a preference for wetland or upland habitat, nor is encroachment on riparian corridors listed a significant factor for their decline (NJDEP, 2004b).

***Recommendation: It is recommended that the Highlands Council accepts that the Landscape Project, Version 2.0 will not stand up to the rigors of regulatory challenges, and withdraws it as a means of determining critical habitat areas. It is recommended that the methodology that demonstrates the positive bias toward large, contiguous forests be addressed. It is recommended that GIS data layers be created for all protected species having special habitat requirements. It is recommended that only sightings verified in the last ten (10) to fifteen (15) years be included in the Landscape Project. It is recommended that once these improvements are made, that the Landscape Project is submitted for a scientific peer review to determine whether it is ready for regulatory challenges, or whether additional improvement is needed. That scientific peer review must be led by an disinterested party outside of DEP, such as an editor of an established, professionally-recognized scientific journal. Until such time as all of the data layers within the Landscape Program can sustain critical review, we recommend that the previous method of searching the Natural Heritage Database (with dates of sightings also reported to the land steward) be used to determine possible presence of protected fauna (excepting present layers involving wood turtle, bald eagle foraging, and urban peregrine falcon). As the methodologies of the Landscape Project are even less suited to plant data than animal data, we further recommend that the Natural Heritage Database be used to determine presence of protected flora.***

#### Defining Rare Species and Significant Natural Areas

The Committee is very concerned that fundamental science is being ignored and legal protections are being extended to species that have been determined to not warrant such protections. For example, under the suggested description for “significant natural areas,” endangered and rare plants are to be considered when assigning a “biodiversity conservation value” to such an area. Plainly speaking, the Committee is concerned that such a “significant natural area” would encompass vast contiguous forests across a landscape scale. The Committee recognizes that plant establishment and reproduction is largely dependent on microclimate. Therefore, landscape-scale protection is neither warranted nor justified to protect plants.

In addition, plant species of concern are to factor into the assignment of a biodiversity conservation value. Plant species of concern are identified by the Natural Heritage program of the Office of Natural Lands Management as worthy of study for consideration to become listed as “endangered.” Such a list is authorized under the NJ Endangered Plant Species List Act (NJSA 13:1B-15.151). Under that legislation, the subject of rare plant species is addressed:

*“‘Endangered Species’ means any native plant species whose survival in the State or the nation is in jeopardy, including but not limited to, plant species designated as listed, proposed, or under review by the federal government [under the Endangered Species Act], any additional species known or believed to be rare throughout its worldwide range, and any species having five or fewer extant populations within the State;” (NJSA 13:1B-15.153)*

While the Committee seeks to enhance and foster biodiversity through careful planning and management implementation, plant species of concern have no scientific basis for enhanced protection.

The definition of rare species includes animal species of concern. Animal species of concern may be alluded to in the legislation: “the list of nongame species regulated pursuant to this Act” (NJSA 23:2A-6). However, it is much more likely that the aforementioned list refers to “species or subspecies of wildlife which are deemed to be endangered elsewhere” (NJSA 23:2A-2c) given the historical context that the NJ Endangered and Nongame Species Act preceded the federal Endangered Species Act. It is also given that the legislation seeks to afford special protection only to endangered species (see NJSA 23:2A-2b). Therefore, this policy affords protections to species intentionally not afforded protections in the authorizing legislation, and affords protections not based by science.

It is recommended that the definition of rare species be set as “animal and plant species listed as threatened or endangered by the State.” By affording protection to each and every species that the Highlands Council deems to be rare would completely undermine the scientific process set in place for the proper consideration for listing and conservation of truly imperiled species.

**Recommendation: *Remove all references to plant and wildlife “species of concern” from the Regional Master Plan framework. Further, “significant natural areas” should have a firm and reasoned basis, and not encompass entire contiguous forests.***

#### Forest Integrity and the Difference Between Edge Effects and Forest Fragmentation

The Committee is deeply concerned regarding large scale applications of the “forest integrity” metric. Forest integrity, as defined in *Assessing Forest Integrity and Naturalness in Relation to Biodiversity* by the UN Food and Agriculture Organization, is a single index which encompasses (1) area effects, (2) edge and gradient effects, and (3) isolation effects. (Interestingly, included in the same study is the “naturalness” metric, which deems all human presence and activity as negative.) The conclusion of that report states:

*“Declining spatial integrity of forests is a consequence of many types of human activity, especially land conversion, and is likely to have adverse effects on the natural biodiversity complements of remaining forests.” (Kapos et al, 2000)*

As such, two important points are raised. First, by “regional”, the UN likely is speaking of North America, not the 88 municipalities of the NJ Highlands. This is well represented by the fact that the report specifically states that the minimum forest size to be considered under such a regime would be 2,470 acres (10 km<sup>2</sup>) in size. Second, forestry activities do not cause forest fragmentation. While certain forestry activities may cause an increase in edge effects, only land use change and other semi-permanent disturbances cause forest fragmentation.

**Recommendation: *Although the forest integrity metric may be of limited use in the NJ Highlands, the Council’s time would be better spent evaluating projects on their impact on water resources. In the event that the forest integrity metric is utilized in some way, it is important to differentiate activities that cause temporary edge effects from permanent or semi-permanent activities that result in forest fragmentation.***

## Unintended Consequences of Species “Protection”

The Committee is concerned that its understanding of “protected species” varies considerably from others. Foresters protect species by improving or creating habitat. At no point in any material the Committee has reviewed from the Highlands Council or staff has there been discussion of creation of habitat for protected species. Worse, the implied strategy for perpetuating protected species appears to be largely passive and computer-based, rather than active and on-the-ground.

Furthermore, “protection” as it has traditionally been applied in New Jersey, has unintentionally been applied to the detriment of threatened species. Consider declining populations of neotropical migratory songbirds. Much has been made about lack of understory caused by deer browse, and the impact on songbird population. A sensible approach would be to limit deer population by encouraging hunting, particularly deep within contiguous publicly owned forest lands. However, by limiting ATV access (for protection reasons), hunter penetration within core forest areas is being discouraged to the detriment of protected species.

In addition, although land use change negatively impacts most protected species habitat, the actions of land managers within the DEP over the past 20 years have not created habitat for protected species on state lands. As a result, the Committee would like proof that fee simple acquisition of land is more effective than purchase of conservation easements or development rights. This is particularly important given the current state budget deficit contrasted with the adaptive nature of the capitalist free market system working to improve private “preserved” lands.

In order to effectively conserve protected species, habitat conservation plans are needed for each species or group of species understood to share the same habitat needs. By having such plans developed by a working group composed of professionals across several disciplines, the final document would be most likely to be broadly accepted and utilized as part of appropriate land management plans.

***Recommendation: The Committee recommends perpetuation of protected species through the collaborative development of habitat conservation plans, and the creation of habitat based on those plans. In addition, should active management continue to be severely curtailed on state-owned lands within the NJ Highlands for more than three years, the Council should seek to address the issue of further fee simple acquisitions as potentially harmful to protected species, in comparison to permanently preserved private land.***

## Scenic Resources Recommendations

Forest regeneration harvests result in short-term impacts on scenic quality, particularly when viewed from road- or trail-side areas. Guidelines for minimizing roadside aesthetic impacts have been developed within the forestry community (Chunko and Wolfe, 1997), and largely adhered to in New Jersey for the last twenty years.

When seen from a distance (e.g. from a scenic vista) such a regeneration harvest may appear to be an agricultural field or pasture or area of shrub/scrub forest, given a year of regrowth. Following several years, as these areas enter the process of crown closure, such areas will again resemble preconceived notions of forests. The important thing to realize is that long-distance negative visual impact attributed to forest management is limited in duration, often less than one year.

There is a clear difference from permanent or semi-permanent visual impacts from residential, commercial, or industrial development and the land use change associated with that activity.

**Recommendation: *Impacts to scenic resources should be differentiated between short-term and long-term or permanent impacts, dependent on the reviewed activity.***

### Promotion of Renewable Resources

Many studies have been conducted within the US and worldwide in determining environmental impacts of various building materials, particularly for construction of single family homes and the construction of other buildings. These studies focus on the environmental impacts of building materials, specifically wood, steel and concrete, using "embodied energy", a method of analyzing all the energy used to extract, manufacture and deliver the product. A recent analysis in 2004 by the Consortium for Research on Renewable Industrial Materials, a non-profit corporation composed of 15 different research universities, found that wood was by far the best choice for building material based on several environmental factors.

When comparing wood to steel framing, the study found that steel required 17% more energy than wood, caused 26% more global warming potential, a 14% higher level of air emissions of concern, and a 300% higher level of water emissions of concern. When comparing wood to concrete, the study found that concrete required 16% more energy than wood, 31% more global warming potential, 23% higher air emissions of concern, and 51% more solid waste (Perez-Garcia et al, 2005). Similar results were found by the Canadian Wood Council in recent studies, by a University of Sydney study (Glover, 2001), and are replicated in the environmental impact estimator software ATHENA, used by architects (<http://www.environmental-expert.com/software/athena/athena.htm>).

In addition to the virtues of wood as a building product, no other material can boast the virtues of wood in its developmental stages. As wood is grown, forests provide the wealth of environmental virtues we are aware of including clean air, clean water, carbon sequestration, wildlife habitat, soil conservation, scenic beauty, recreation opportunities, etc. Wood is renewable, and can be sustained through forest management.

**Recommendation: *Due to the overwhelming data showing wood to be the most environmental friendly building material available, coupled with the renewable nature of the forest through sustainable management, as well as the myriad of environmental benefits of the forest itself, any green building standard that the Regional Master Plan cites or recommends should embrace wood as an environmentally friendly product.***

## **Conclusion: A permanent funding source for wildlife habitat improvement**

The tasks of planning, implementing, and reviewing sustainable forestry practices are not without cost. While expenditures on forestry work on large, private lands can be justified by savings through the Farmland Assessment program, additional work regarding education and outreach is needed for public land managers and private landowners throughout the region. For many years, these decision-makers have been saturated with inaccurate information regarding the practice of forestry and its effects on water, forest health, and wildlife. The goal of this document is to present the leading scientific information regarding the benefits of sustainable forestry and its application to the NJ Highlands region.

Many of the members of this Committee have made the observation that sustainable forestry and ecosystem management are actually synonymous. “Ecosystem management” is defined as:

*“management guided by explicit goals, executed by policies, protocols, and practices and made adaptive by monitoring and research based on the best understanding of the ecological interactions and processes necessary to sustain ecological composition, structure, and function over the long term” (Helms, 1998)*

Nothing within that definition or the preceding pages of this document precludes management of forest ecosystems for wood products. Therein lies a permanent funding source for wildlife habitat improvement, forest health, water yield, and other desired objectives, particularly for average and above-averaged size ownerships. Highlands timberlands are 53% oak/hickory type and 25% northern hardwoods type (Phelps and Hoppe, 2002). According to DEP figures (Reyes and Mates 2004), the stumpage value at final harvest would be just over \$1,500 per acre for each of these two types, although exact value will be site-specific and may range from \$500 to more than \$2,500 per acre.

As such, wood harvests can be a major funding source for sustainable forestry and ecosystem management projects within the NJ Highlands. In addition, funds from harvests can be used to leverage cost-share funding available from federal sources including the Forest Lands Enhancement Program (private lands), Wildlife Habitat Incentives Program (private and non-federal public lands), Conservation Reserve Enhancement Program (private lands), Environmental Quality Incentives Program (private land with a major agricultural component), and the Landowner Incentive Program (private lands).

One of the key findings of the 2002 USDA Forest Service Highlands study update was:

*“The biodiversity and arrangement of different habitat types in the Highlands creates an important mosaic that supports the high species biodiversity of the Highlands region.” (Phelps and Hoppe, 2002 p.59)*

By practicing sustainable forestry on public and private lands, foresters and landowners seek to continue these processes while protecting the state’s drinking water, forest health and other significant resources.

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Duly adopted at a meeting of the Sustainable Forestry Technical Advisory Committee to the Highlands Water Protection and Planning Council, held of this 28<sup>th</sup> day of March, 2006.

<u>Name</u>	<u>Approve</u>	<u>No response</u>	<u>Did not attend</u>
Judson Bennett, CF	<u>X</u>	<u>          </u>	<u>          </u>
Lorraine Caruso	<u>          </u>	<u>          </u>	<u>X</u>
Emile DeVito, Ph.D.	<u>          </u>	<u>X</u>	<u>          </u>
Troy Ettel	<u>X</u>	<u>          </u>	<u>          </u>
Ronald Farr, CF	<u>X</u>	<u>          </u>	<u>          </u>
Heather Gracie-Petty, CF	<u>X</u>	<u>          </u>	<u>          </u>
Steve Kallessner, CF (for Christina Harrigan, CF)	<u>X</u>	<u>          </u>	<u>          </u>
Wayne Martin, SAF	<u>X</u>	<u>          </u>	<u>          </u>
George Pierson, SAF	<u>X</u>	<u>          </u>	<u>          </u>
Anthony Sblendorio	<u>          </u>	<u>          </u>	<u>X</u>
Ronald Sheay, SAF (for Andy Kimm)	<u>X</u>	<u>          </u>	<u>          </u>
Douglas Tavella, SAF	<u>X</u>	<u>          </u>	<u>          </u>
Mark Vodak, Ph.D., SAF	<u>X</u>	<u>          </u>	<u>          </u>