PREVENTATIVE THINNING AT ROCKY POINT PINE BARRENS STATE FOREST

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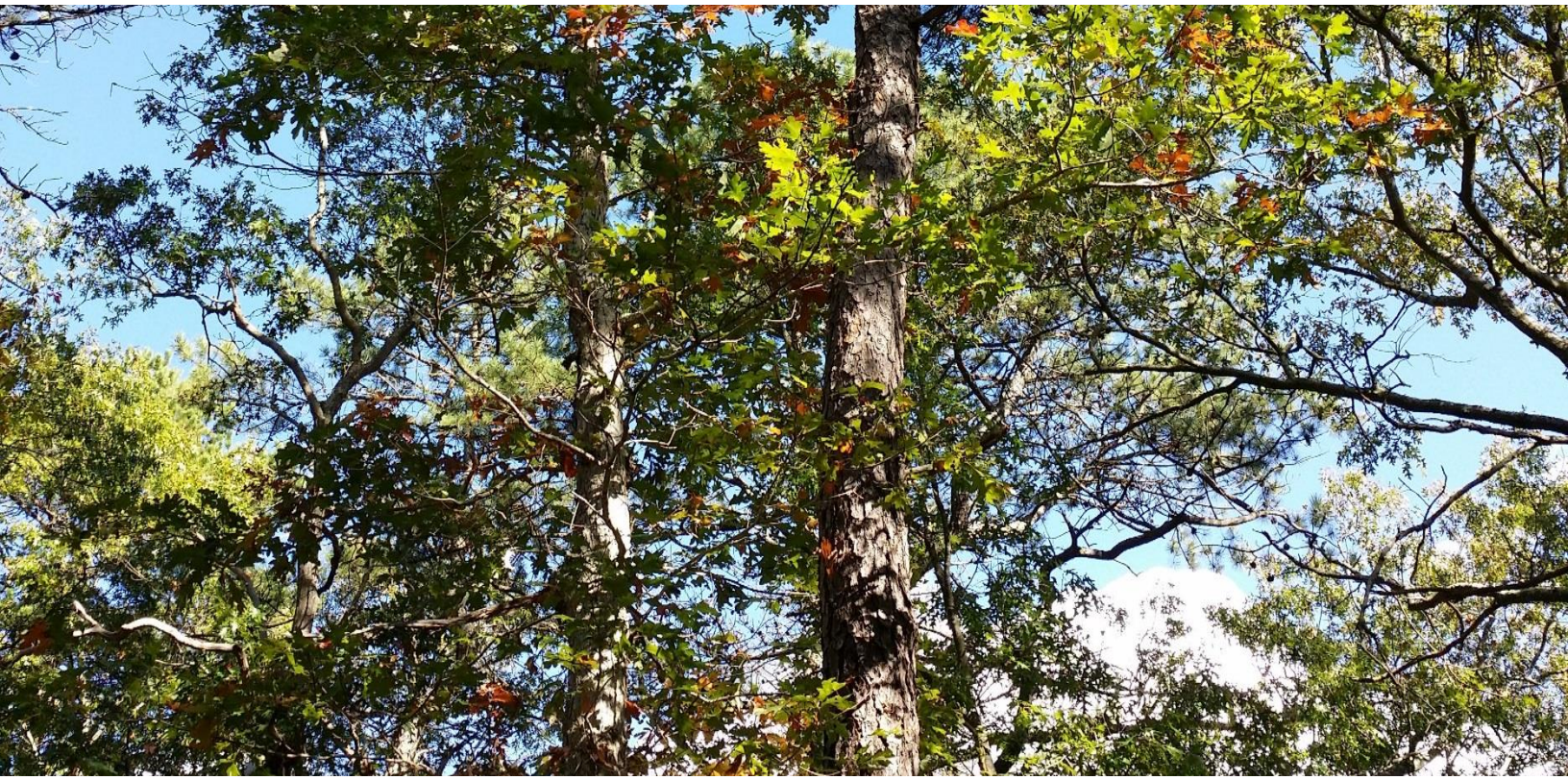

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Since the discovery of southern pine beetle, thousands of pitch pine trees have been infested and killed. To help prevent further tree mortality, preventative thinning treatments have been considered for over-stocked stands at Rocky Point Pine Barrens State Forest. Questions have been raised on the preventative thinning technique such as how the stands were chosen for thinning, if thinning matches the management goals for the stands, if it would be bad to just let all of the pitch pine trees die, if thinning is a proven technique, how thinning will affect unique and endangered species, and if thinning matches the land use history of the stands. In preparation for the thinning, DEC reviewed the current scientific literature and developed a thinning prescription for stands at Rocky Point Pine Barrens State Forest believed to be consistent with the management goals of both the DEC and the Central Pine Barrens Commission.

Forest stands are often managed to accomplish goals such as to enhance endangered species habitat, decrease fire hazards, or decreasing the effects of invasive species. The management goals at Rocky Point Pine Barrens State Forest are to:

III.A.1 "Protect, manage, and enhance the natural resources of the unit, while providing multiple use opportunities."

III.A.2 "Promote biological diversity through enhancement activities which will not permanently damage the naturally occurring plant and animal communities" (Unit Management Plan, 1996).

These management goals are reflected in Environmental Conservation Law §57-0121 and in the Central Pine Barrens Comprehensive Land Use Plan Volume 1 (in which Rocky Point Pine Barrens State Forest is included) in that the land use plan for the Central Pine Barrens area should:

2.a "Protect, preserve and enhance the functional integrity of the Pine Barrens ecosystem and the significant natural resources, including plant and animal populations and communities".

And, more specifically, that the plan goals for the Core Preservation Area should accommodate:

3.d "Specific Pine Barrens management practices, such as prescribed burning, necessary to maintain the special ecology of the preservation area".

For these goals, the Central Pine Barrens Comprehensive Land Use Plan states that active management should be used to "restore degraded habitats, favor native over nonindigenous species, and maintain or restore ecosystem processes upon which the continued existence of the Pine Barrens depends". In this, active management, including periodic fires or other disturbance processes, should be used for the forest's "rejuvenation and maintenance". Also, "where scientifically justifiable, active management by cutting, fire, removal of invasive species, or other techniques to prevent the loss of wetland communities or other species" should be used so that "no known existing rare, threatened or endangered species should be extirpated from the pine barrens" including "if an extant species becomes a federally listed species under the Federal Endangered Species Act" or "downward trends of individual species are documented" (Central Pine Barrens Comprehensive Land Use Plan, 1996) such as is currently occurring for pitch pine. Preventative thinning treatment for southern pine beetle would help to accomplish shared goals of the DEC and the Central Pine Barrens Commission.

Prior to thinning, stand inventories and analyses were completed for Rocky Point Pine Barrens State Forest to find the stand basal area (amount of area occupied by tree stems), stand density index (based on the number of trees in the area and the trees' diameters, or how large the trees are), and quadratic mean diameter (estimates average tree diameter). The stand inventories and analyses were used together to develop a hazard model to predict which areas in Rocky Point Pine Barrens State Forest are the most susceptible to southern pine beetle attack, and therefore are good areas to apply preventative thinning (Curtis and Marshall, 2000; Shaw, 2006). After the hazard model was developed, specific stand prescriptions were applied with thinning objectives for removing pitch pine and tree oak species within the stand with the overall goal of preventing southern pine beetle. These prescriptions take into account how the thinning will affect unique and endangered species within the area.

Pitch pine is an important part of Central Pine Barrens and is currently being threatened by southern pine beetle. According to the Natural Heritage Program, several communities on Long Island that are made up, at least in part, of pitch pine (dwarf pine plains, pitch pine-oak-health woodlands, pitch pine-scrub oak, and pitch pine-heath barrens) are not only rare and unique in New York State, but also globally rare. However, if these sites were to lose their pitch pine components, they would no longer be considered rare or unique communities statewide or globally because they would transition to more common community types such as successional blueberry heath, successional old field, successional shrubland, successional maritime forest, or successional southern hardwood forest (Edinger et al., 2014). If these stands become closed-canopy oak-dominated forests, it will be unlikely that pitch pine will regenerate well (Ledig and Little, 1998; Gucker et al., 2007), as pitch pine is shade intolerant (Little and Garrett, 1990; Day et al., 2005) and needs full sunlight, bare soils, and a nearby seed source to have successful regeneration (Jordan et al., 2003). This may further lead to extirpation of pitch pine trees from the currently globally rare Central Pine Barrens ecosystem.

Thinning is a commonly-used southern pine beetle management tool that has been reviewed several times over the past decade; most recently by Nowak et al. in 2015. Thinning has been shown to reduce likelihood of attack by southern pine beetle (Nowak et al, 2008; Guildin, 2011; Costanza et al., 2012; Schowalter, 2012) and/or large losses of pitch pine trees if an infestation does begin (Fettig et al., 2007) by lowering the stress and increasing the health of individual trees (Waring and Pitman, 1985; Feeney et al., 1998; Sala et al., 2005; Zausen et al., 2005; Wallin et al., 2008). In a recent study, 99.7% of all forest stands attacked by southern pine beetle had not been thinned (Nowak et al., 2015). There is no way to fully guarantee prevention of southern pine beetle in thinned stands, however the DEC is confident that the probability and intensity of southern pine beetle attack will be reduced, protecting the surrounding pitch pine resources. Research in the Central Pine Barrens conducted by the DEC also indicate that infestations are spreading more than one and a half times faster in sites with higher total basal area (>80ft^2/acre) (99% confident high and low basal area infestation rates statistically differ, $P<0.01$) (Hassett and Cole, 2015 unpublished). This is likely due to individual tree stress in these stands from competition for nutrients, water, and sunlight; further supporting the use of thinning in the Central Pine Barrens. Preventative thinning treatment will open the currently over-stocked forest canopy, encouraging rejuvenation of the forests through healthier individual trees.

Thinning as a preventative treatment for SPB will also promote biodiversity and benefit unique and rare vegetation and wildlife. State endangered and threatened plant species in the area prefer open, sandy pine barren habitats (Gleason and Cronquist, 1991; New York Natural Heritage Program,

2010) including Little-leaf tick-trefoil (Fernald, 1950; Leif, 2013), showy aster (Reed, 1993), slender pinweed (List of Rare Plant Species by Habitat Type, 2008), and sandplain wild flax (Natural Heritage Endangered Species Program. 2009) and these species will directly benefit from the thinning as competition for sunlight will be reduced. The two NY state species of special concern, the coastal barrens buckmoth (also globally vulnerable) and eastern spadefoot toad are restricted to pitch pine scrub-oak barrens. The coastal barrens buckmoth will benefit from the increase in the amount of scrub oak due to thinning, which it needs to feed and reproduce on (Natural Heritage Program, 2010; Bried et al., 2014). The eastern spadefoot toad will benefit from the increase in open sandy areas, which it needs for burrowing, which will result from the thinning (Eastern Spadefoot Toad, 1999, Natural Heritage Program, 2010). The state threatened, globally rare frosted elfin will benefit from the thinning as its food plants grow in open pine barren habitats (Natural Heritage Program, 2010; Bried et al., 2014). In these ways, thinning will protect existing biodiversity and further enhance the functional integrity and biodiversity of the Pine Barrens ecosystem.

Although it may seem like a fully-natural system, Rocky Point Pine Barrens State Forest has had hundreds of years of land management from previous owners. There is evidence on the North end of the property that a colonial settlement was located there, and it is likely that fire was used prior as a land management tool by local Native Americans on the unit as it was for much of Long Island. Most recent ownership prior to the DEC was The Radio Corporation of America Global Communications. While under this ownership (early 1920's to 1978), much of the land was cleared and had transmitting stations, antenna fields, roads, trails, firebreaks, buildings, and other accessory structures built on it to transmit short and long radio waves. Many of these structures have been removed and management has been applied to help reach the goals of this forest stand (Unit Management Plan, 1996).

Southern pine beetle poses a great threat to the natural pitch pine habitats on Long Island, including Rocky Point Pine Barrens State Forest. Preventative thinning is a commonly-used management technique that has had a high rate of success in preventing southern pine beetle infestation and decreasing its spread and damage in areas that were susceptible to attack. Use of preventative thinning treatment for southern pine beetle would help to accomplish the shared goal of the DEC and the Central Pine Barrens Commission to protect, preserve, and manage the declining, ecologically important pitch pine resources while also helping to reach other shared goals such as enhancing the rare biological diversity and functional integrity of the Pine Barrens ecosystem.

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