

Pinelands Ecosystem Case Study

The Pinelands Ecosystem Case Study was funded by a National Fish & Wildlife Foundation grant with matching private donations. The purpose was to research and apply various integrated vegetation management (IVM) techniques to determine the best vegetation management practices necessary to meet the primary objectives of electric ROWs and secondary benefits to natural resources and society within the coastal plain of the Pinelands National Reserve, New Jersey.

This Study could influence the following management concerns:

1. Improve safety and reliability of our nation's energy, communication and transportation corridors.
2. Meet the EPA's Pesticide Environmental Stewardship Program (PESP) goal to lower the level of risk to humans and the environment by the use of herbicides and other IVM techniques.
3. Reduce nitrogen and sedimentation pollution by managing for native riparian vegetative buffers at waterway crossings and wetlands.
4. Increase our nation's Homeland Security by improving the integrity of America's energy grids.
5. Control and reduce acreage lost to invasive, exotic plant species.
6. Improve and increase wildlife habitat, especially for those species dependent on early successional plant communities.
7. Improve and increase habitat for threatened and endangered species and demonstrate cooperative management under the Endangered Species Act.
8. Increase fire safety and suppression efforts in support of our National Fire Plan and Healthy Forest Initiative.
9. Improve habitat of wildlife refuges, forests, and parks.
10. Improve management and safety of military installations and bases.
11. Lower exposure of personnel to dangerous mower equipment operation.
12. Decrease pollution to the environment by oil, hydraulic fluids, and exhaust inherent in mower and cutting equipment operation.

Primary Objective – Best IVM practices in the Pinelands National Reserve

Meetings were held with the various stakeholders to explain the need for adopting an integrated vegetation management (IVM) approach in the Pinelands including; Pinelands Commission, National Audubon Society, Electric Utilities (Atlantic Electric, Jersey Central, Public Service Electric & Gas), South Jersey Gas, Garden State Parkway, New Jersey DEP, U.S. Fish & Wildlife Service, NJ Chapter of the Nature Conservancy and Rutgers University. The discussions proved to be the impetus for the Pinelands Commission to form a committee consisting of the 3 electric utilities, the Bureau of Public Utilities and Pinelands staff to review vegetation management practices by utilities and discern which practices enhanced habitat diversity consistent with Pinelands historical plant communities.

**ELECTRIC TRANSMISSION
RIGHT-OF-WAY MAINTENANCE PLAN
Second Draft Project Outline
February 9, 2005**

PROGRAM GOAL

Prepare right-of-way (ROW) management plans that create and maintain relatively stable and sustainable, early successional habitats that:

1. Represent characteristic Pinelands reference-habitats, such as scrub-shrub vegetation, emergent wetlands, and intermittent ponds;
2. Provide habitat for native Pinelands plants and animals, including threatened and endangered species;
3. Reflect the size, shape, and spatial distribution of characteristic Pinelands reference-habitats;
4. Reflect local soils and hydrologic features;
5. Reflect within-patch heterogeneity similar to characteristic reference-habitats;
6. Avoid planting;
7. Are compatible with surrounding landscapes (e.g., locate grasslands adjacent to farmland);
8. Ensure transmission reliability and safety;
9. Require minimal subsequent management; and
10. Minimize the need for individual Pinelands permit reviews.

IVM Pinelands Study Site

IVM Partners was aware of some existing documentation of plant community changes on Atlantic Electric rights-of-way (ROW) by Michael Robin Haggie of Chesapeake Wildlife Heritage, Easton, MD. The site is in Cape May County, NJ just outside of Pinelands National Reserve jurisdiction and in close proximity to rare plant populations on Nature Conservancy land. A decision was made to continue documentation of these plant communities under this grant before and after vegetation management techniques were performed. Mowing and hand cutting had occurred on the study site in 1998 and the plant community (herb and shrub, desirable and undesirable) was analyzed beginning in fall 2001. Mowing was again performed in 2003 and an herbicide treatment was applied in fall 2005.

Herbicide Treatment

Atlantic Electric instructed its contractor to herbicide treat the Cape May study site in late fall 2005. The brush was treated with an herbicide combination of Krenite (fosamine), Arsenal (imazapyr) and Escort (metsulfuron) applied with backpack sprayers while the phragmites and brush in standing water were treated with Habitat (imazapyr). Vegetation had changed to fall coloration at the time of treatment but had not experienced a killing frost.

Study Results

Shrub Stem Count

Haggie documented plant community changes using 10 plots of 30 square meters each and found that mowing and hand cutting increased the stem count and relative density of woody vegetation (shrubs), especially the undesirable red maple (*Acer rubrum*) and sweet gum (*liquidambar styraciflua*) trees. Total shrub stem count in the 30 plots stood at 2,563 in the fall of 2001, as a result of the mowing and hand cutting in 1998. This count jumped to 3,993 stems (from resprouts and branching documented at 30 centimeters from ground level) in the fall of 2004 due to the second mowing cut in 2003. Undesirable trees dominated this vegetation at 58% of stems in 2001, and increased to 66% of stems by 2004. The herbicide treatment in 2005 reduced woody vegetation to a mere 433 stems in the fall of 2006, and 62% of this total were desirable shrubs. An additional year of growth increased this stem count to 1,093 in the fall of 2007, but the percentage of undesirable stems reverted back to 66%, leading to a recommendation of a follow-up selective herbicide treatment.

Shrub Ground Cover

As a percentage of test plot ground cover, shrubs (woody vegetation which included trees <5 centimeters at ground level) canopied only 7% of the ground in the fall of 2001, and then increased to 37% the following year. The mowing of 2003 reduced shrub canopy to 26% in the fall of 2004, but it jumped to 61% cover by fall of 2005. After the herbicide treatment of fall 2005, shrub canopy dropped to a low of 4% the following autumn, which increased to 11% by the fall of 2007.

Shrub Diversity

Comparing herbicide treated versus mowed but untreated plots, the cut/untreated plots contained only 6 woody specie after cutting operations; Red maple, Sweet gum, Sweet pepperbush, Fetterbush, High bush blueberry and Blueberry. The herbicide treated plots contained 11 species of shrubs that included Red maple, Sweet gum, American holly, Sweet pepperbush, Fetterbush, Male berry, Swamp azalea, Blackberry, High bush blueberry, Blueberry and Arrow-wood viburnum.

Herb Ground Cover

Documentation of the herbaceous plant community changes involved using 30 plots of 1 square meter each. Herb ground cover measured during the spring of each year found herbaceous plants covering 50 - 65% of the ground cover as a result of cutting operations. Following the autumn 2005 herbicide application, herbs increased to 70% of the ground in spring 2006 and further increased to 84% of cover in spring 2007.

Herb Diversity

The number of herbaceous species remains relatively constant (15-18 species) throughout the spring of each year, progressing through the mowing and subsequent herbicide treatments. A close examination of the fall data, and the impact of shrub competition and shading, shows that the surveyed count drops to 11 herb species in the fall of 2003 just prior to mowing. As a result of the 2005 herbicide treatment that reduced the undesirable tree count by 90%, the number of herb species reached a high of 23 in the fall of 2007, with a significant reduction of invasive species.

The contrast in diversity between cutting and herbicide treatments was even more pronounced when looking at plots left as controls and not herbicide treated in 2005. Allowing two more growing seasons following the mowing operation of 2003 enabled the undesirable shrub species to further increase in height and density. This dense canopy of undesirable shrubs only permitted 8 herb species to exist in the shaded understory; versus the 23 species thriving in the sunlight-rich plots that had been herbicide treated in 2005.

Non-native Invasive Impact

The non-native reed grass phragmites (*Phragmites australis*) was also found in some of the plots but did not become invasive until the mowing operation of 2003. The cutting operation exacerbated the situation by releasing multiple sprouts of the undesirable trees and phragmites, producing a canopy that covered 88% of the ground. This undesirable canopy was reduced to only 6% ground cover by the herbicide treatment of 2005, which had the unexpected positive result of encouraging the reestablishment of a rare native wetland plant community through increased light penetration.

Threatened & Endangered (T&E) Species Habitat Restoration

The 2005 herbicide treatment that removed most of the undesirable trees and phragmites allowed the germination of the rare Pogonia orchid (*Pogonia ophioglossoides*) in the spring of 2006. Evidently the seeds had been lying dormant in the wetland soil and germinated when competition from trees and phragmites was removed, a coastal plain effect similar to that expected with the natural occurrence of fire. The orchid was found in 2 of the plots where it constituted 1% of the ground cover. An additional year of growth expanded its density to 2% in 2007. This change in plant community was even more pronounced in areas outside of the designated transect plots. Several hundred orchids were observed growing under the dead canes of herbicide-treated dense stands of phragmites. 3 samples of 1 square meter were taken of these orchid populations ranging from the least populace (8% of ground cover) through the mid-range (56% of ground cover) to the most populace (82% of ground cover). Restoring a rare, coastal plain flower from a site dominated by an aggressive, non-native plant with one herbicide treatment is quite a remarkable feat.

Pineland Commission/Rutgers Field Tour

An invitation was sent to the Pinelands Commission and Rutgers University to conduct a field tour of the site and observe first-hand the plant diversity in the herbicide treated plots versus the mowed areas. In May 2007 a field tour was conducted by Rick Johnstone and Robin Haggie with John Bunnell and Mariana DuBrul of the Pinelands Commission and Aaron Love and Rick Lathrop of Rutgers University in attendance.

Recommendations

A complete analysis and report was presented to the Pinelands Commission and Rutgers University in spring of 2008, with a recommendation that the study site receive a selective backpack herbicide treatment as soon as possible and that Rutgers University continue to monitor plant diversity of the study site.

The information and practices found on the electric ROW study area could be used to develop criteria on similar ROW for other coastal plain areas and is applicable to vegetation management of private or public lands not used for ROW. The protocol and cooperation between the various partners could establish the parameters for similar cooperation in other geo-physiological regions of the country.

Integrated Vegetation Management Partners, Inc. will act as a liaison for furthering education and development of research and implementation of findings with other potential partners under similar projects throughout the country. As these studies are completed, they will be posted on this website for continuing public education.

Fundraising

Tax deductible donations to conduct ecosystem management studies and document best integrated vegetation management practices across North America are encouraged and will be acknowledged by IVM Partners, Inc., a 501-C-3 non-profit corporation. Make your checks payable to:

IVM Partners, Inc.

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