



# Narragansett Bay

## *Research Reserve*

Technical Report

2010:3

### **NBNERR Woodcutting Stewards Program Report**

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## **Introduction**

The Narragansett Bay National Estuarine Research Reserve (NBNERR or Reserve) woodcutting stewards program, which utilizes volunteers for program implementation, has been applied to address a number of NBNERR stewardship program goals. Program activities have contributed to habitat management in a variety of settings and employed both selective- and clear-cutting as appropriate. Used in combination with other land management activities (e.g. prescribed fire, mowing) or alone, the woodcutting stewards program remains an important tool for meeting management objectives while involving the local community. This program report will be updated periodically to report on annual woodcutting activities, document changes to program goals or objectives, serve as a warehouse for documenting supplementary management activities in target areas and habitats, record results of program efforts, and list recommendations for future management efforts.

## **Program Justification**

In an effort to promote continued stewardship of Reserve properties, it is imperative that we utilize all tools that are currently at our disposal. Toward that end, the woodcutting program on Prudence Island, with its long history, is being applied toward stewardship activities on the Reserve. Woodcutting stewardship activities mutually benefit island residents through the acquisition of firewood and the Reserve through the removal of unwanted vegetation at no cost. Additional program benefits include the opportunity to promote research and education as well as an economic incentive.

### *Stewardship*

The NBNERR Stewardship program adopted a series of guidance documents in 2006 to direct stewardship activities on the Reserve (e.g. A Recommendation for the Management of Atlantic Coastal Pine Barren Habitats within the Narragansett Bay National Estuarine Research Reserve, The Narragansett Bay National Estuarine Research Reserve Stewardship Program: Invasive Species Management Plan, The Narragansett Bay National Estuarine Research Reserve Stewardship Program: Landscape Management Plan). The goals and objectives outlined in these guidance documents direct the activities of the woodcutting stewards program. Specifically, the NBNERR Woodcutting Stewards Program contributes to the management of rare habitat, generation / maintenance of early- to mid-successional habitat, and invasive species removal.

### *Research and Education*

In keeping with the mission of the reserve system to promote research, education and stewardship in protected coastal areas, the woodcutting stewards program requires an education and research component. NBNERR staff has established permanent photopoints and sampling sites to document changes in the vegetation community over time. Participants in the woodcutting stewards program are provided background material regarding specific program targets and the expected outcome of their volunteer activities (i.e. promote greater understory vegetation, non-native plant reduction). In addition, NBNERR staff communicates the purpose of this stewardship activity to the general public by posting appropriate signage and documentation on our website ([www.nbnerr.org](http://www.nbnerr.org)).

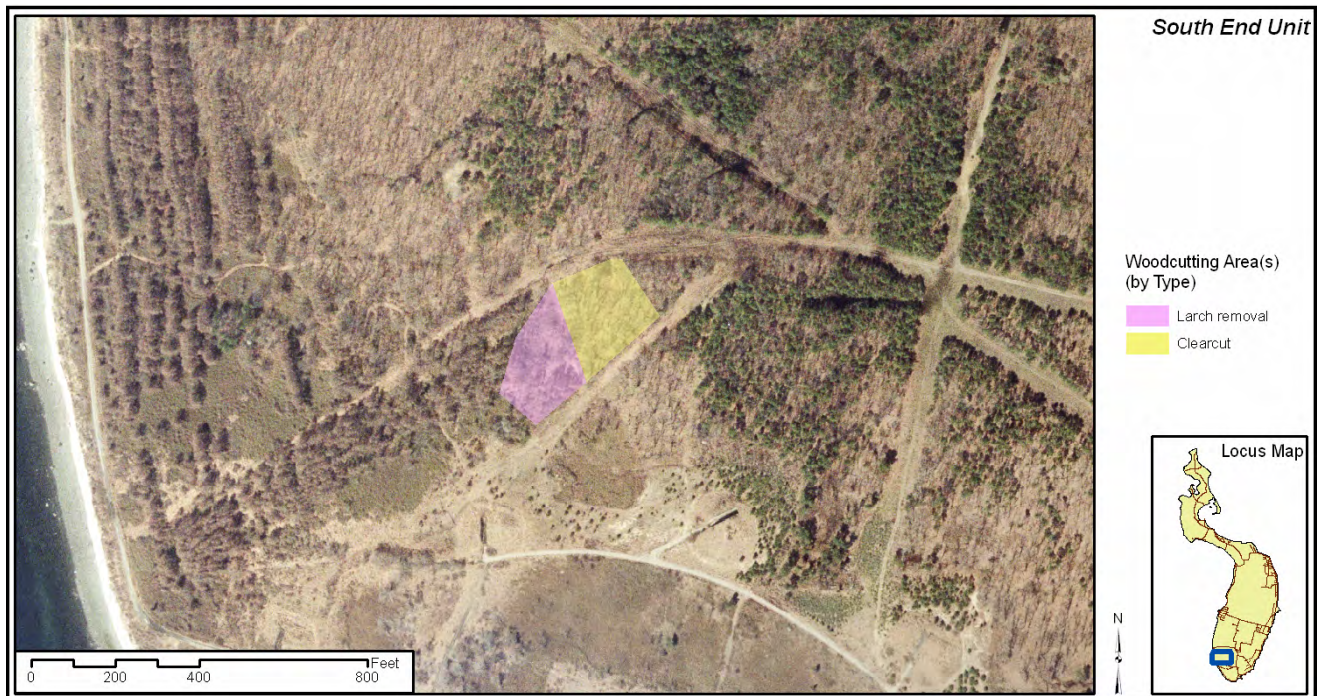
### *Economic Benefit*

As NBNERR is dependent on both federal and state funding, the opportunity to utilize volunteer labor for stewardship programs is encouraged whenever possible. The Woodcutting Stewards Program is expected to require greater than 200 volunteer hours to implement annually. These volunteer hours are used to match federal funds.

## Program History

Although woodcutting has been used as an active management tool on NBNERR properties since the 1980's, very little documentation exists regarding the extent of the program in past years and the effectiveness of this program in meeting specific management goals. The NBNERR woodcutting program was largely conducted within the broader home fuelwood program launched by the Rhode Island Department of Environmental Management (RIDEM) in state management areas in response to the energy crisis of the late 1970s. In addition to providing fuelwood, the selective woodcutting helped to improve wildlife habitat by stimulating new growth, and by creating den trees and cavity nesting sites. This state-wide program was discontinued largely because staffing short-falls made oversight of the program difficult. The fuelwood program continued on NBNERR properties for a period of years and participants were awarded the right to cut trees on a competitive per-lot bid basis.

The NBNERR Woodcutting Program was redesigned in 2005 to deemphasize fuelwood and promote stewardship as its primary function. Program activities are now designed with specific stewardship goals in mind and mechanisms identified for evaluating the effectiveness of the program. Over time, the collective descriptions of past woodcutting activities, as well as the cumulative effects of associated management efforts (e.g. prescribed fires, mowing) where appropriate, will illustrate best management practices within varied forest habitats.



**Map 1: 2005/2006 Woodcutting areas by type.**

### 2005/2006 Program Report

Woodcutting occurred on the following dates: Dec. 8, 15, 20, 22, 27 (in 2005) and Jan. 5, 9, 10, 11, 12, and 13 (in 2006). Twelve volunteer stewards participated and accumulated approximately 120 volunteer hours in each year of this program. The program was designed to clear cut an oak dominated stand within the South End pitch pine mosaic to both promote pitch pine (*Pinus rigida*) regeneration and establish grassland; and to begin the removal of approximately 25 acres of undesirable European larch (*Larix decidua*), which had begun to naturalize in this area. Program

participants were required to cut two larch trees for each oak tree that they harvested. Larch is not considered by program participants to be good quality fuelwood, so participants were provided the option of leaving the cut trees on-site.

Many felled larch trees have been utilized by Reserve staff and island residents as benches, road blocks, fenceposts, etc. because they are rot-resistant. However, many of the tree trunks remain scattered throughout the woodcutting area. Future larch removal efforts should require that the cut trees be placed in discrete piles to allow mowing to occur as a follow-up management activity if necessary.

A casual survey of the woodcutting area in November 2007 shows little difference in the groundcover which is currently present in areas that had been dominated by oak or larch. Switchgrass is abundant throughout, but there is little evidence that the woodcutting activities have been successful at promoting the regeneration of pitch pine in this area. Future management should include a controlled burn to reduce accumulated leaf litter and promote pitch pine seedling growth.

#### 2007 Program Report

Woodcutting occurred on the following dates: Jan. 9, 11, 13, 18, 20, 23, 25, and 27. Twenty volunteers participated in the program, accumulating approximately 200 volunteer hours and removing an estimated 100 trees. The 2007 woodcutting stewards program was to be conducted in two distinct locations to accomplish specific stewardship goals however the geographic extent of the proposed management areas and the limited number of participants restricted program activities to just one target area, the South End pine barren mosaic. Management actions included selective cutting in pitch pine-oak and oak-pine forested areas to open the canopy and reduce the progression to a closed canopy hardwood forest.

Trees larger than 25" diameter at breast height (DBH) were marked by NBNERR staff for removal along T-Wharf Road to allow greater light to penetrate to the forest floor. Trees with less than 25" DBH are generally believed to be top-killed by fire so the smaller trees were allowed to remain to test this hypothesis with a scheduled 2007 spring burn. A controlled burn was conducted in the pine barren mosaic on two separate dates: March 30 and April 10, 2007. Although effective at removing a portion of the accumulated leaf litter in many areas, the fire had little impact on the humus layer and few barren mineral soil patches resulted. The burn also had no impact on established trees as none of the smaller oak trees were top-killed by fire, which had been expected. A second controlled burn should occur as soon as possible to remove the remaining accumulated leaf litter and further reduce the humus layer.

A second area was targeted for limited clear-cutting in sections where oak trees have successfully displaced pitch pine. Two clearcuts of comparable size (approximately one quarter acre) were created on either side of an existing firebreak. One clearcut was oriented to receive morning sun exposure and the other afternoon sun exposure. It was hypothesized that the effectiveness of a clearcut in promoting pine seedling growth would be a function of not only the size but orientation of the clearing.

Specific objectives in the pine barrens were (1) to determine the degree to which understory vegetation increases and (2) the density at which pitch pine seedlings become established under different management strategies.



**Map 2: 2007 Woodcutting areas by type.**

A random survey was conducted in November 2007 of the woodcutting area along T-Wharf Road and an area of comparable size which had not been cut. Pitch pine seedlings occurred at six to seven times the frequency of seedlings in the intact, uncut stand which suggests that the woodcutting activity was effective at promoting pitch pine regeneration. The surveyed areas had both been burned during the spring, so it is supposed that the increased sunlight was largely responsible for the increased growth of seedlings. Leaf litter is heavier within the uncut forested stand at the time of the survey, so these results may have been influenced by a reduced ability to locate seedlings.

Surveys were also conducted within the two clearcuts and in adjacent uncut forested stands of comparable size and orientation along the firebreak. A comparable number of pitch pine seedlings were found in the two uncut control sites, although one site was burned in the spring and one was not. There was only a modest increase in the cut + unburned site but twice the number of pitch pine seedlings occurred in the cut + burned site. It is not known whether the difference is entirely attributable to the burn, as this site also receives far more sunlight throughout the course of the day because of its orientation in relation to the firebreak. It will be necessary to repeat this investigation to determine which factor has the greatest influence on pitch pine regeneration.

### 2008 Program Report

Woodcutting occurred on the following dates: Jan. 10, 12, 19, 24, 26, 29, 31, and Feb. 2 and 16 (a “raindate” for Jan. 15). Thirty-five volunteers participated in the program, accumulating approximately 500 volunteer hours and removing an estimated 180 trees. The program was designed to address a variety of specific stewardship goals and took place in two distinct locations on NBNERR managed properties.

### *North End Unit*

In an effort to both promote a better understanding of the issue of invasive plants on NBNERR properties and to prepare a degraded forest area for the re-establishment of native species, invasive

Norway maple (*Acer platanoides*) and Black locust (*Robinia pseudoacacia*) were removed from a selected 4 acre area on the North End unit. Norway maple has been recognized as a serious threat to native plant communities because of its ability to become locally dominant, creating dense shade which displaces native trees, shrubs and herbs. Black locust forms dense groves by root suckering, spreads aggressively in disturbed sites, and is capable of nitrogen fixation.



**Map 3: 2008 woodcutting area in the native forest restoration site of the North End unit.**

The invasive tree removal was limited to an area adjacent to an existing road and firebreak near the entrance gate. The woodcutting stewards were also required to cut oriental bittersweet (*Celastrus orbiculatus*) vines from trees that were not marked for removal but which were located adjacent to their work area. This activity hopefully helped retain some of the native trees, as many would eventually have died as the result of the bittersweet infestation in these areas.

As a component of a native forest restoration effort, this woodcutting program activity represents only a first step in preparing the site for planting with native trees and shrubs. It was known that the nature of Black locust reproduction would require additional follow-up control efforts for many years, specifically the application of herbicide to the cut stumps of stump sprouts and clones.

The original sampling objective was to determine the mean number of Norway maple seedlings becoming established at locations within and at specified distances (e.g. 30 m, 60 m, 90 m) from the border of the current stand. Norway maple seedlings were to be removed from sampling sites in each successive year to determine whether the removal of mature trees had an impact on the frequency of seedling establishment over time. As additional stands of Norway maple exist in this unit of the Reserve, this evaluation would have been useful for directing future management activities. Unfortunately, this sampling design and objective was not met due to the tremendous resurgence of understory growth with the opening of the canopy and a return to normal precipitation levels (the preceding year was a moderate drought year).



**Map 4: 2008 woodcutting areas by type in the pine barrens of the South End unit.**

#### *South End Unit*

The Atlantic coastal pine barrens which occur on South Prudence are a locally and regionally rare habitat type. Management actions proposed for the South Prudence pine barren mosaic include selective cutting in pitch pine-oak and oak-pine forested areas to open the canopy and reduce the progression to a closed canopy hardwood forest. In order to allow for the regeneration of pitch pine, open areas with full sunlight and barren or scarified soil must be present. A second proposed management action is the removal of European larch, which are naturalizing and spreading within the pine barren mosaic, altering the structure and function of this habitat.

Trees were marked by NBNERR staff to establish two large (greater than one-half acre) clearcuts within selected areas of oak dominated forest which occur within the pine barren mosaic. Once the fuel wood had been removed and slash stacked, a tractor was to be used to ensure that patches of barren soil were present within the clearcut areas to promote the regeneration of pitch pine seedlings. [Unfortunately, exposure of mineral soils using the tractor was not done due to scheduling restrictions.] In addition, each steward was required to remove two non-native European larch for every oak tree harvested in an effort to reduce the geographic extent of this plantation.

Sampling objectives in the pine barrens were the same as those listed for the previous years' program, specifically: (1) to determine the degree to which understory vegetation increases and (2) the density at which pitch pine seedlings become established under different management strategies.

#### 2009 Program Report

Woodcutting occurred on the following dates: Jan. 6, 17, 20, 22, 24, 31, Feb. 5, 7, and Feb. 12, 21 (as "raindates" for Feb. 3 and 5). Thirty-two volunteers participated in the program, accumulating approximately 450 volunteer hours and removing an estimated 130 trees. The program was designed to contribute to the invasive species removal effort, the management of rare habitat and the

reestablishment of native forest. To achieve these objectives, woodcutting activities took place in three distinct locations on NBNERR managed properties.



**Map 5: 2009 woodcutting area in the larch plantation of the South End unit.**

In addition, a public informational meeting was held on Jan. 3, 2009 to provide an overview of long-term program goals and inform potential participants about program changes to be implemented in the 2009 program. Changes to the program included harvest restrictions per household and the fulfillment of past program obligations (e.g. larch removal) as a prerequisite to continued program participation.

#### *South End Unit*

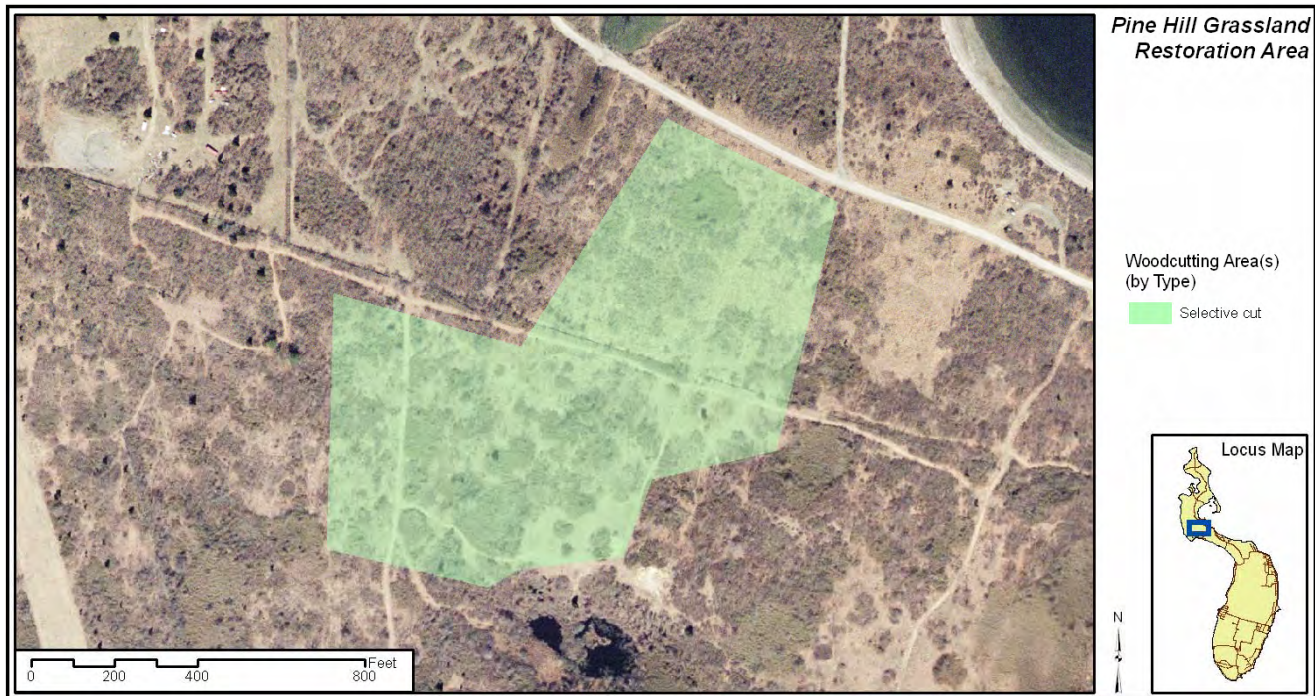
Larch removal had been a target of the woodcutting stewards program for a period of years and the 2009 program emphasis was to ensure that all participating woodcutters had an opportunity to contribute equitably to this control effort. Many 2008 program participants did not have an opportunity to remove their required number of larch due to limitations in the program schedule. Woodcutting stewards who wished to participate in the 2009 program were required to remove a minimum number of larch trees, whether they were new participants in the program or they did not meet their obligations from the previous year. 2008 Woodcutting stewards who did meet their minimum requirement for larch removal were not obligated to participate in this component of the 2009 woodcutting stewards program.

#### *Pine Hill Grassland Restoration Area*

Grassland habitats will convert to shrubland and forest in the absence of management activities designed to interrupt this process. Grassland restoration efforts in 2008 on Reserve managed lands included the mechanical clearing of 18 acres of a grassland / shrubland complex in the vicinity of Pine Hill. The clearing was conducted by Reserve staff and RIDEM Div. of Fish & Wildlife contracted labor and is part of a long-term plan to establish a greater than 80 acre grassland in this area. A next step in this restoration effort was the removal of many of the small trees (primarily black cherry



[*Prunus serotina*]) which are scattered throughout the restoration area. Shading by these trees, if not removed, would impede the recovery of warm season grasses.



**Map 6: 2009 woodcutting area in the grassland restoration site at Pine Hill.**

With few exceptions, all trees occurring within the grassland restoration area were available for harvesting. Woodcutting stewards were encouraged to take the larger black cherry trees as well as cut down smaller trees in the immediate vicinity of their cutting area to ensure that a majority of the trees on-site were removed. Larger oak trees were marked by Reserve staff for retention as these trees provide an excellent source of food for wildlife and are relatively scarce in this area.

#### *North End Unit*

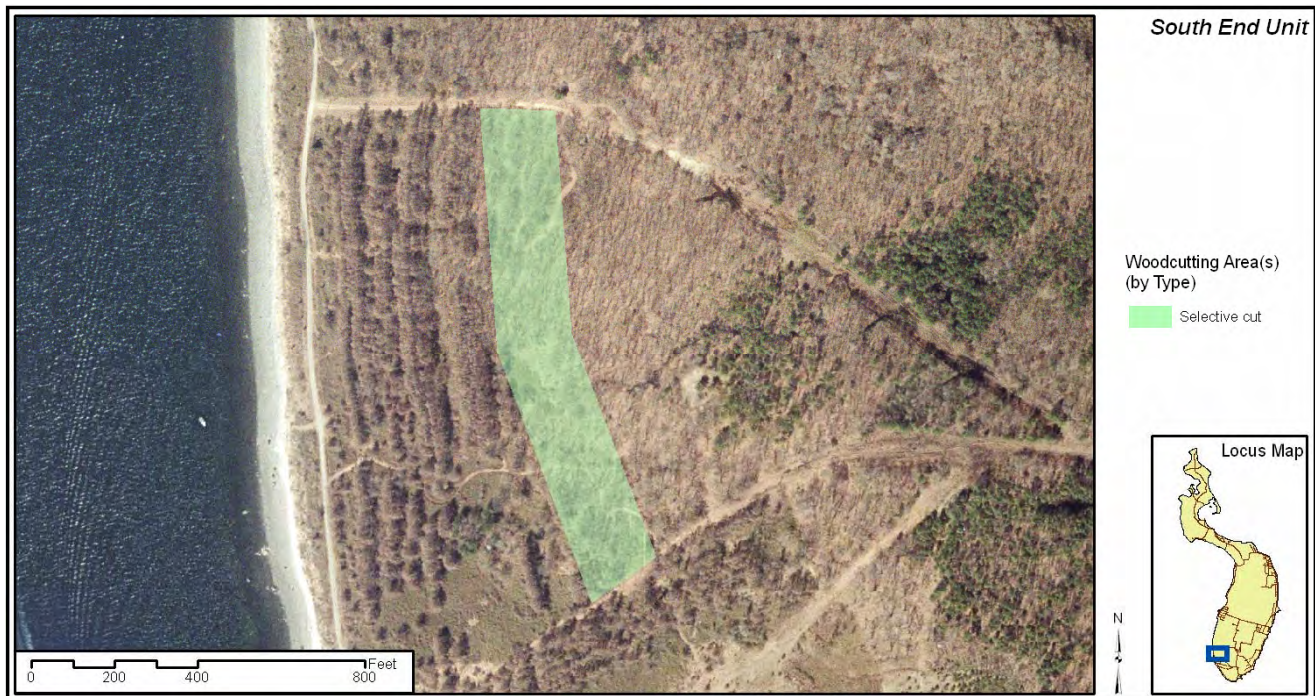
In a continuing effort to promote a better understanding of the issue of invasive plants on NBNERR properties and prepare a degraded forest area for the re-establishment of native species, invasive Norway maple and Black locust were targeted for removal from a selected area on the North End unit.

As during the 2008 program, the focus of invasive tree removal was limited to an area adjacent to an existing road and firebreak near the entrance gate. The woodcutting stewards were also required to cut bittersweet vines from trees that were not marked for removal but which were located adjacent to their work area. This activity hopefully helped retain some of the native trees, as many would soon die as the result of the bittersweet infestation in these areas. [Refer to Map 3 for delineation of North End woodcut area.]

#### 2010 Program Report

Woodcutting occurred on the following dates: Jan. 23, 28, 30, and Feb. 2, 4, and 6. Twenty-one volunteers participated in the program, accumulating approximately 250 volunteer hours and removing an estimated 90 trees. The program was designed to contribute to the invasive species removal and habitat management efforts. To achieve these objectives, woodcutting activities were scheduled to take place in three distinct locations on NBNERR managed properties. Unfortunately,

woodcutting activities planned for the North End as well as the Pine Hill grassland restoration area did not take place due to concerns about existing road conditions and the potential impact of increased traffic to these areas.



**Map 7: 2010 Cutback zones in the South End unit.**

### *South End Unit*

As an extension to previous woodcutting program activities and a component of the Reserve’s pine barrens management strategy, a twenty-five acre stand of European larch had been contracted for removal to allow for the restoration of grassland and old field habitat as early successional components of the barrens mosaic. As conditions and resources permit, next steps in this restoration effort will include a prescribed burn to reduce fuel loading, expose mineral soils, and promote regeneration of fire-dependent pitch pine within the larch removal site as well as an additional thirty-five acres of mixed vegetation types.

Cutback zones to improve field and woodland border habitat were created along the edge which exists between the larch stand and the mixed hardwood stand bounding it on the east side. Selectively cutting trees within cutback zones allows sunlight to penetrate the canopy and create a broader edge to enhance wildlife use. Trees of various age and species were marked for removal to ensure the greatest degree of structural diversity in the remaining edge habitat. Woodcutters were also required to collect and distribute ten pitch pine cones for each hardwood tree removed to ensure the pre-burn presence of pitch pine seed throughout the restoration area.

### **Supplementary Management Activities**

No documentation exists for habitat maintenance/management activities within Reserve managed properties throughout the 1980-90’s. However, it is believed that at least four prescribed burns (two within the south end pine barrens and two within the north end unit) occurred within that time frame.

Additionally, RIDEM Fish & Wildlife conducted large scale clearing for the purpose of habitat enhancement, fire suppression, and educational resource development (most notably at the North End Farm site) at multiple locations on state owned properties when these properties were components of the Bay Islands Park system and in more recent years.

Supplementary management activities that have occurred in conjunction with the NBNERR Woodcutting Stewards Program since its inception in 2005 include the following by management area:

#### *South End Unit*

The application of prescribed fire is known to be the most essential management tool for maintaining the pine barrens mosaic within the south end unit. Two days of controlled burning were conducted in 2007 under the direction of RIDEM Div. of Forest Environment staff utilizing staff/volunteers from RIDEM Div. of Fish & Wildlife, RIDEM Div. of Enforcement, Portsmouth Fire Department, Prudence Island Volunteer Fire Department, and NBNERR. Although these fires were effective in increasing the rate of pitch pine regeneration in burned areas they did not meet other management objectives which included the removal of duff, accumulated leaf litter, and woodcutting slash piles.

In 2009/10 the Reserve, through assistance from a Natural Resources Conservation Program Wildlife Habitat Incentive Program (NRCS WHIP) grant and in coordination with the Audubon Society of Rhode Island (ASRI), engaged a contractor for the removal of the remaining trees within the 25 acre stand of European larch adjacent to the pine barrens mosaic. The contractor was required to remove all larch within a defined boundary, generate discrete logging slash piles of restricted dimensions, and remove all tree trunks greater than 8" in diameter from the site and transport them off-island. Unfortunately, this last contracted component has not yet been completed as the result of inappropriate actions by the designated Contract Officer. In the event that this contract component remains incomplete the project outcome, as described in the WHIP grant application materials, will not be achievable.

In addition to 2010 woodcutting program participants, volunteers in 2009 (coordinated through a Americorps program at the Roger Williams Park Zoo) physically transported pine cones from existing pitch pine stands and distributed them within the larch stand. This activity was conducted to ensure that a seed source was available for the expansion of the pine barrens mosaic into this management area.

#### *North End Unit*

In 2009 and 2010 summer seasonal workers were employed jointly with the Prudence Conservancy to conduct numerous tasks in support of both agencies' stewardship program efforts. Within the north end forest restoration site, tasks included the removal of non-native shrubs, vines, and herbaceous plants. It also included cutting and applying herbicide to stump sprouts and clones of black locust trees which had been removed during the woodcutting stewards program.

In 2009 and 2010 the Reserve also conducted a joint fund-raising sale of native trees and shrubs with the Prudence Conservancy in support of the forest restoration project. More than sixty native trees and shrubs (representing greater than 20 species) were planted by volunteers within this site to enhance species diversity.

*Pine Hill Grassland Restoration Area*

As a follow up to the initial 2008 clearing of old field habitat (which had begun to progress toward shrubland and thicket) periodic mowing by Reserve staff has been conducted to promote the establishment of warm season grasses and reduce the extent of greenbrier (*Smilax rotundifolia*) patches.

**Program Effectiveness**

In addition to casual surveys and anecdotal determinations of program effectiveness, vegetation surveys were conducted within the south end pine barrens mosaic in 2010 to determine the degree to which woodcutting activities and prescribed fires have influenced the rate of pitch pine regeneration within this managed habitat. Surveys occurred at randomly selected points within areas reflecting a variety of past and planned management activities. The survey areas were selected to include both actively managed areas as well as comparable areas (by species composition and tree density) where dissimilar management activities were planned to serve as control sites for comparison (see Map 8). Pitch pine seedlings in two discrete height classes were tallied within a 10 meter radius of the sample point locations and per acre estimates were derived. In some instances, the survey was conducted to provide a baseline for comparison as the planned management activity had not yet occurred.

The greatest number of pitch pine seedlings were found in areas that have had prescribed fires in recent years. The number of pitch pine seedlings in post-burn areas is also consistently greater where woodcutting activities (both clear-and selective-cutting) have occurred. The least number of pitch pine seedlings occur within the bounds of a 25 acre larch stand, planted in the 1940-50’s by the U.S. Navy as a wind break. The low numbers of seedlings are not unexpected within this area as the density of the larch stand reduced available sunlight and the stand had few mature pine trees in close proximity to provide a seed source.

**Table 1: 2010 Pine barrens mosaic vegetation survey results.**

Sampling Location	Seedlings < 1 m per acre	Seedlings 1-2 m per acre	Woodcut Type	Dominant Species	Management	
					Year	Burn Status
10	355	0	None	Pitch Pine	2011	Pre-burn
12	250	0	None	Pitch Pine	2011	None
8	6	0	Clearcut	Larch	2010	Pre-burn
9	0	0	Clearcut	Larch	2010	Pre-burn
3	1559	155	Clearcut	Oak - Maple	2008	Post-burn
4	1177	0	None	Oak - Maple	2008	Post-burn
6	351	44	Clearcut	Oak-Maple	2008	Pre-burn
5	536	6	None	Oak-Maple	2008	Post-burn
1	1614	92	Selective	Pitch Pine - Oak	2007	Post-burn
2	591	13	None	Oak	2007	Post-burn
7	130	13	Clearcut	Oak-Maple	2006	Pre-burn
11	76	0	None	Oak-Maple	2006	None



Map 8: 2010 Pine barrens mosaic vegetation survey locations.

### Program Implementation Protocols

The safety of program participants is a primary consideration when implementing the Woodcutting Stewards Program. Toward that end, program implementation has remained consistent from year to year and will continue to be supervised by a NBNERR staff member to ensure that participants are adhering to the conditions outlined in the current year's Woodcutting Stewards Program Agreement form. Implementation protocols are as follows:

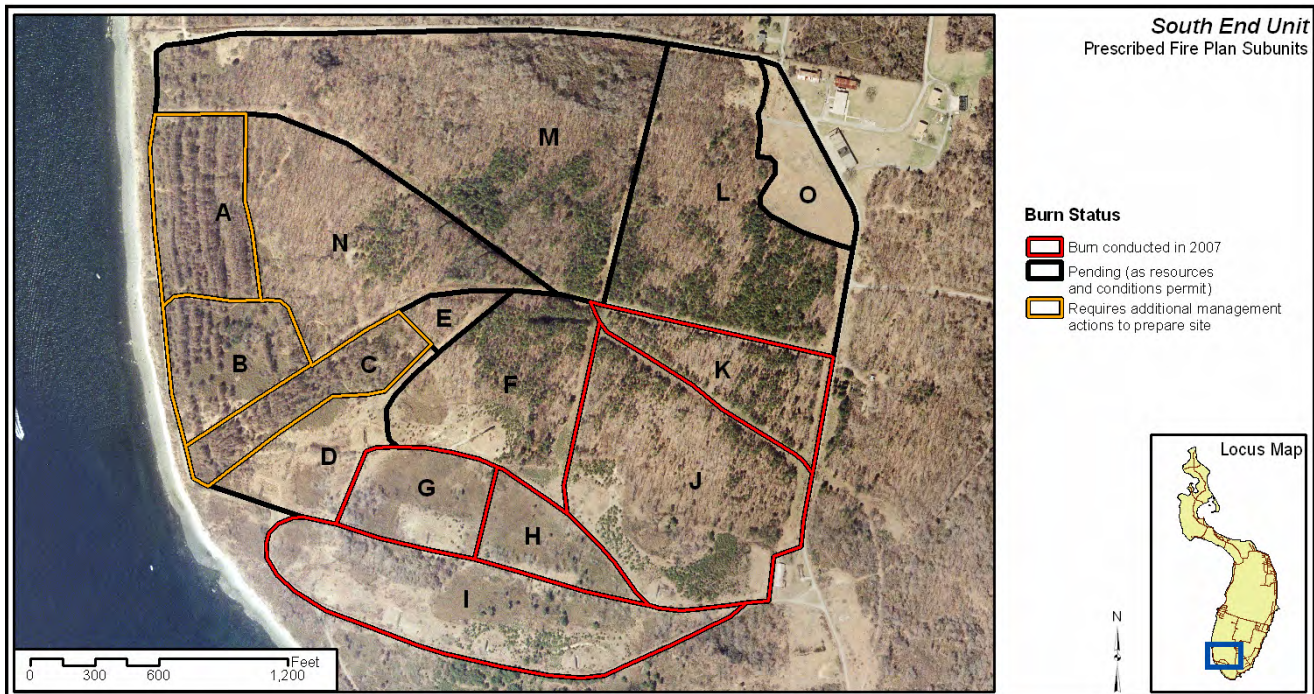
- Each participant is required to sign a release that absolves the NBNERR of responsibility in the event of personal injury or property damage that may occur during program implementation.
- Active woodcutting is restricted to the morning hours (e.g. 8 a.m. to 12 p.m.) and vehicles are required to remain at a safe distance (> 100 ft.) from the nearest woodcutting activity. During the afternoon hours (e.g. 12 p.m. to 3 p.m.) vehicles are allowed into the area for loading firewood. The use of chainsaws during the afternoon is strictly prohibited.
- A NBNERR staff person remains on site for the entire morning cutting period to ensure that participants adhere to safety guidelines (e.g. distance setbacks) and target area boundaries described in the current years' program. A staff person also randomly visits the site during afternoon hours to ensure that no active cutting is taking place.
- The participants are notified prior to the start of the program in writing that any infraction that creates an unsafe environment will result in an immediate cessation of the program.
- Woodcutting activities take place during the winter months to minimize the impact of vehicle use in off-road areas. In the event that weather conditions prevent access to target areas on

scheduled dates, the program is typically extended to include up to three alternate dates as necessary to meet program goals for the specified year.

### Recommendations for Future Program Efforts

The stewardship program guidance documents referenced above remain the best resources for identifying appropriate strategies and uses of the NBNERR Woodcutting Stewards Program. Occasionally, new and unanticipated stewardship program initiatives (e.g. forest restoration) or concerns (such as the presence of a pine beetle infestation and subsequent pitch pine mortality) will direct future program activities. In many instances, future program efforts should be designed as an extension of efforts in previous years. Examples include: selective cutting to prepare degraded forest habitat for native species planting (not yet completed for the first of two planned restoration areas), clear- and selective cutting to promote pitch pine regeneration (an essential component of the Reserve's pine barrens management plan), and the continued removal of small trees within the grassland restoration site which would otherwise impede the establishment of warm season grasses. This last example will be critical as the grassland restoration efforts expand to cover a greater area.

The South End pine barrens mosaic, which requires significant management effort to maintain, will doubtless be a target of woodcutting program efforts in the future. Whenever possible, woodcutting activities should be designed to coincide with other planned management activities, particularly prescribed fire, to generate the greatest benefit. Areas in which prescribed fire is planned for 2011 (as resources permit) include subunits D, E, F, N, L, and O of the Reserve's Prescribed Fire Plan for the South End pine barrens.



**Map 9: Burn status of prescribed fire plan subunits within the South End pine barrens mosaic.**

Conducting vegetation surveys within individual units of Reserve managed lands, as well as the acquisition of new properties, may identify additional future woodcutting program activities. If resources were available, the Reserve would benefit from a broader scale view of management needs,

particularly a forest management plan, to set priorities for management in forested habitats. Although the woodcutting program is not restricted to forested habitat, a forest management plan would provide a clear direction for NBNERR Woodcutting Stewards Program efforts into the future.

## **Conclusions**

It is evident that the NBNERR Woodcutting Stewards Program has been successfully utilized to meet a number of stewardship program objectives. Program efforts have contributed to the management of rare habitat, generation / maintenance of early- to mid-successional habitat, and invasive species removal and should, as resources permit, continue to do so into the future. Although it can occasionally be a challenge to articulate specific stewardship program needs and generate appropriate planning documents due to concurrent stewardship program activities, the woodcutting stewards program should be implemented annually to maintain interest within the local community and ensure volunteer participation. Community involvement is not only critical for program implementation but also expands the Reserve's education outreach potential and provides the Reserve's greatest current volunteer match for federal funds.