

Charlotte Park and Wildlife Refuge Invasive Species Management Plan



Prepared by
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July 2009



Town of Charlotte





Acknowledgements

We would like to thank several parties for making this report possible. Thank you to Jack Pilla, Jenny Cole and Susan Smith of the Charlotte Park and Wildlife Refuge for allowing us to work on this beautiful property, and thank you to Sharon Plumb of the Nature Conservancy for tremendous support in writing this invasive species management plan.

LANDS work was also supported by a grant from TogetherGreen (an alliance of Audubon and Toyota) and support from the Conservation Leadership Seed Fund of the Rubenstein School of Environment and Natural Resources at the University of Vermont (UVM). The Student Conservation Association contributed administrative and program support, oversight, time, and financial resources. Finally, thanks to the Green House Residential Learning Community staff at UVM for lending us their great facilities.

About The LANDS College Conservation Corps

The field of conservation is rapidly evolving to meet the growing demands of society. New ideas and strategies are changing how we conserve and steward land. The Land Stewardship Program (LANDS) is one of these new ideas. During the great depression, the conservation corps model was pioneered as a means to promote stewardship in the nation and provide jobs for the unemployed. That idea has since been reinvented 116 times by local and state corps across the United States. However, the general theme is the same -- young people learning *and* growing through service. LANDS is an innovative College Conservation Corps designed to train tomorrow's conservationist practitioners and leaders, and is a pilot partnership between the University of Vermont and the Student Conservation Association in its third year of successful programming.

LANDS crew interns work on projects that are more technical than traditional crew work for a broad range of public and private non-profit organizations. They draft management plans, map areas of interest using GPS and GIS, inventory resources, calculate carbon stocks, and even find time to build trails and remove invasive species. Municipalities, land trusts, state agencies, university researchers, National Forests and Parks, and volunteer-managed conservation organizations all benefit from LANDS's high quality, affordable products. LANDS interns are advanced undergraduates in the natural resources field from all over the world with a range of skills and interests. LANDS is a unique service-learning model that will hopefully be replicated at universities across the nation to address an ever expanding list of conservation needs while training students as future environmental leaders.

This report is the result of work done by interns Gavin Cotterill, Charlotte Gabrielsen, and Ellen Kujawa from The Land Stewardship Program (LANDS) at the University of Vermont. Each year, the LANDS crew breaks up into groups of three to work on smaller, self-directed team projects (STPs). These are proposed by local land trusts and chosen by the interns based on interest. The work has to be rapid and accurate, based on the week-long timeline for the projects. This small-team project was completed for the town of Charlotte at the Charlotte Park and Wildlife Refuge.

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INTRODUCTION

Site Description

The Charlotte Park and Wildlife Refuge is a scenic 290-acre property made up of forest and agricultural land. Some of this agricultural land is actively managed for pasture and haying, while other parts lie fallow and are in various stages of succession. The property also contains abandoned apple orchards, old stone walls, and overgrown roads. The cover types include hardwood forest, open field, shrubland, and wetlands.

There are four areas in particular that best represent intact northern hardwood forests free of non-native invasive species (NNIS). These are the quaking aspen/ash/paper birch stand along the railroad (accessible by mowed maintenance vehicle path), the sugar maple stand where the Robert's Way trail meets the Byington Trail, the Turkey Lane area, and a bitternut hickory stand on the east side of the Byington Trail where it runs adjacent to the park boundary (see map). These areas have the most canopy closure, the oldest trees, and the least abundance of NNIS. The sugar maple and Turkey Lane areas also have (by far) the greatest diversity within the herbaceous layer of any part of the property.

The wetlands and shrublands grade into one another on much of the property. There are distinct shrublands west (and downhill) of the Varney Trail. The plant composition of this area is 75%+ composed of honeysuckles. Nevertheless, wildlife such as Brown Thrashers and Eastern Towhees can be seen and heard here. These are two birds that are positive indicators for ecological health in shrublands. Mark Labarr, of Green Mountain Audubon, has done some shrubland bird monitoring at the park and hopes to do more in the future.

The wetlands are scattered about the western part around the Robert's Way trail. They are most obvious around the year-round water features (i.e. stream crossings). The area around "The Big Oak" in particular is interesting as it seems to sit along a north-south running ridge that is surrounded by saturated soils. This area is most like the Valley Clayplain Forest natural community which probably covered this entire park prior to European settlement.

Agricultural fields, generally speaking, provide little in the way of meaningful habitat for wildlife. Their value lies in providing open views for the human experience at the park. Spectacular views such as those provided by fields and pasture are rarely open to public access. The hedge rows between fields, however, do provide wildlife corridors for Eastern cottontails, red foxes, bobcats, and many other animals. All of the hedgerows at the park have some amount of buckthorn and honeysuckle, but proved to be surprisingly diverse. Elms, bitternut hickories, ash, dogwood species, and the occasional staghorn sumac are all common to the hedgerows.



Unfortunately, many of the trails (particularly in the lower, wetter areas) are lined with defacto hedges containing buckthorn and honeysuckle. This is likely due in part to the increased sunlight they get from the trail opening, trail soil compaction associated with the trails, and from the fact that fewer woody plant species compete well on these saturated sites.

Recreational Purpose and Management Goals

The Charlotte Park and Wildlife Refuge's 3 miles of trails are intended for hiking, cross-country skiing, and equestrian use. Several of the fields in the eastern part of the property are used for corn, and others are hayed, in an effort to preserve the property's historical usage. Many of the once-cultivated fields are reverting to forest.

These meadow areas are managed for wildlife. Within the last decade, white-tailed deer, raccoons, numerous bird species, coyotes, skunks, foxes, and bobcats have been spotted within the park.

Invasive Species Interfere with Management Goals

Invasive species are usually introduced to an area by humans who plant them in their yards or gardens. From domestic areas, the invasive



plants spread to undeveloped areas nearby, and since they are free from their natural predators they are able to out-compete native species and reproduce rapidly. The replacement of native species by non-native species can alter an ecosystem from insects to top predators. They do not provide the same food and shelter as native plants do.

The Charlotte Park Committee requested an updated weed management plan for the Charlotte Park and Wildlife Refuge. With help from Sharon Plumb of the Nature Conservancy, UVM Land Stewardship interns mapped priority areas on the property and made recommendations for management of these areas.



Table 1: Invasive Species Inventory

Species	Location and Abundance
Common and Glossy Buckthorns <i>Rhamnus cathartica</i> and <i>Rhamnus frangula</i>	Found throughout; forested area; small saplings throughout Turkey Lane trail area; in hedgerows.
Honeysuckles <i>Lonicera morrowi</i> and <i>tatarica</i>	Dense honeysuckle on N & S side of Robert's Way; large shrub area near Byington and Varney trails.
Amur maple <i>Acer ginnala</i>	Found along much of the trail by the parking lot. Also along Robert's way trail, concentrated in wet area west of the big red oak.
Purple loosestrife <i>Lythrum salicaria</i>	In several seeps/stream areas along Thorp & Byington area; east side of park; along field edge; in wetlands/streams off Robert's Way.
Japanese barberry <i>Berberis thunbergii</i>	Several plants in Turkey Lane.





INVASIVE WEED MANAGEMENT PLAN

The work plan detailed below will be helpful in guiding invasive species management efforts on at the refuge for the next five years (2009-2014). At the end of this period, the committee will assess how well goals are being met. Due to the growth patterns and density of these species, it will not be feasible to eliminate all occurrences of all invasive species from the park. However, with steady work each year, intentional re-plantings, further spread can be reduced, new infestations can be prevented, and native species will be allowed to thrive.

The following section outlines the weed management plan. It includes:

- a. An outline of **management priorities** including ecological priorities, priorities by species, and land use priorities.
- b. A **timeline of seasonal activities** that includes when activities will take place, what equipment is needed, and how many staff and/or volunteers.
- c. A **species by species summary of management options**. This is summarized from available research and TNC local experience managing invasive species.

Management Priorities

Priorities are set with the goal of achieving greatest ecological impact while minimizing the total, long-term workload. Priorities are determined in order to first, prevent new invasions and second, to control existing infestations that affect the most highly valued area(s) of the site. The difficulty of control is also considered, giving higher priority to plants and patches that are most likely to be effectively controlled with available technology and resources. This management plan also considers how the site is used. For example, honeysuckle makes trail maintenance difficult throughout the park so it should be kept back along a corridor running through the park.





Ecological Priorities in Order of Importance

1. "Intact" forest areas: preventing an increase in NNIS occurrences
2. "Intact" forest native herbaceous plantings: seedbank is probably vastly depleted from years of agricultural use. This is also a great way to give volunteers a break from the usual brunt work while adding wildlife value to the park. Turkey Lane would be a great place to start because it already has some herbaceous plant diversity, few NNIS, and seemingly the least foot traffic from park visitors. All of these factors increase the likelihood of success.
3. Herbaceous plantings should be conducted in conjunction with increased wildlife monitoring. The white-tailed deer population in particular needs to be closely monitored. The Park Committee should be prepared to consider deer hunting or exclusion if the deer population is causing damage to the understory of the forest. Because they preferentially eat native species, deer overpopulation has the ability to actively reduce native herbaceous cover while accelerating NNIS growth.
4. Radiating outward from the treatment around the Red Oak, continuing to remove and stump-treat honeysuckle and buckthorn to help bur oaks and swamp white oaks (among other native species) to advance. In time, this area may begin to more closely resemble a patch of Valley Clayplain Forest.
5. Buckthorn and honeysuckle should be the highest priority species, along with closely monitoring for new NNIS to the park, should they appear (i.e. Oriental bittersweet, Japanese knotweed, goutweed, wild chervil, multiflora rose).
6. Japanese barberry plants should be removed, creating as little disturbance as possible. Mechanical removal is recommended because it is effective and may cause the least disturbance.
7. Amur maple, while it does not appear to be a huge threat at this point, should be removed because this can be accomplished relatively easily. Currently there is still a manageable, relatively low abundance of this species on the property. Remove those individuals that are near trails.





8. Purple loosestrife is spread widely throughout the wet areas. Trampling plants in an effort to reach them would probably cause more damage than it would help as disturbance tends to favor NNIS. If these small infestations are removed, replant the areas with native species. Alternatively, the Vermont Department of Environmental Conservation's Water Quality Division releases beetles near large infestations of purple loosestrife. The beetle larvae eat loosestrife leaves and stems and reduce seed production.

Land Use Priorities

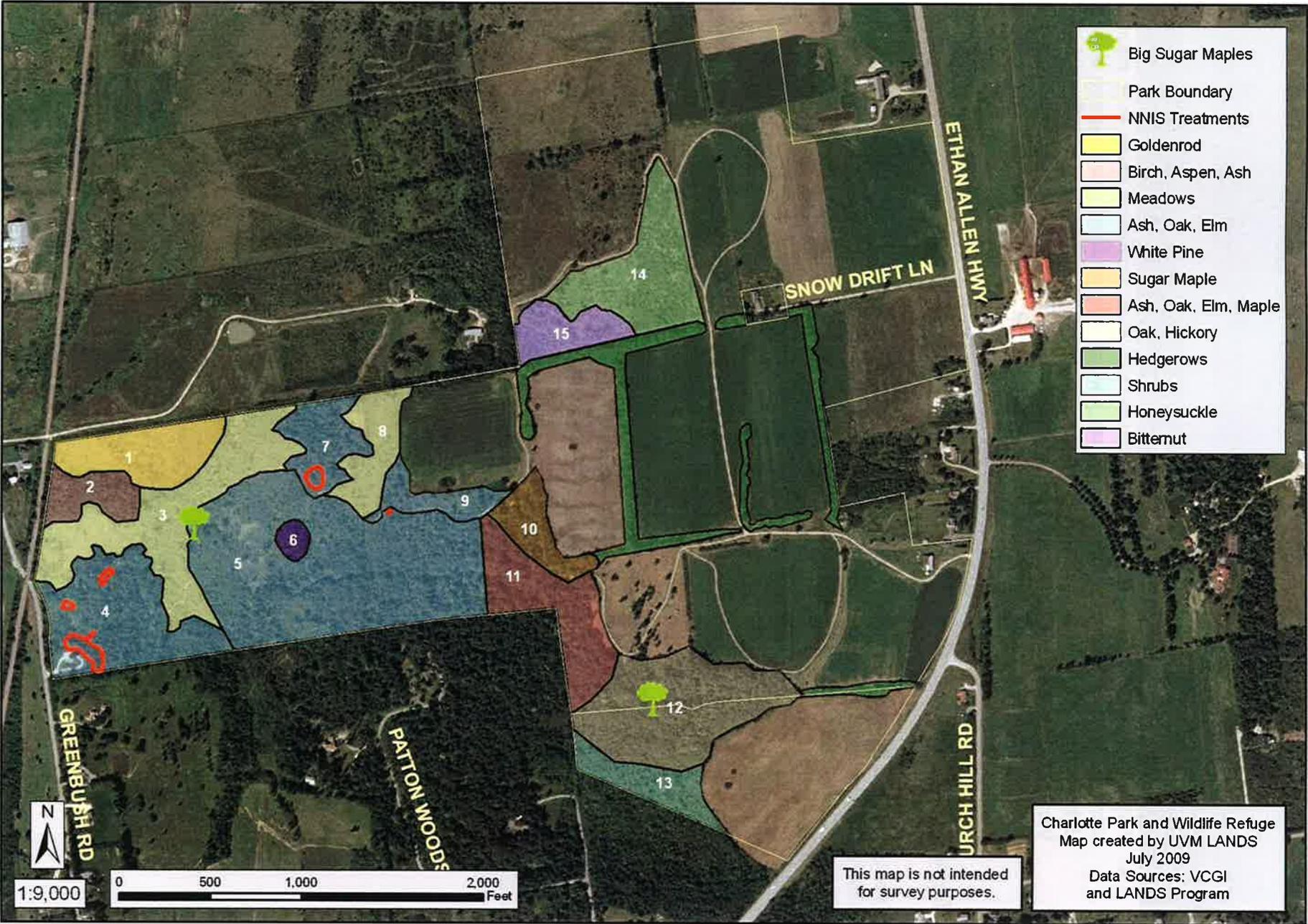
It is tempting to focus on the heavily infested honeysuckle areas throughout Robert's Way area, but that task is likely to lead to "volunteer burn out." It is also a lower ecological priority (see "*Management priorities*"). Instead, focus removal treatments species around the large oak and maple, but also do quite a bit of thinning to promote the success of the native regeneration that is happening.

1. The trails along Robert's Way, keeping the experimental treatment areas free of invasives.
2. The less infested areas on Robert's Way near the large oak tree (a point of interest for hikers).
3. Thin buckthorn seedlings around the large maple on Turkey Lane.
4. Remove well-established honeysuckle in the hedgerow where the Byington Trail meets the Varney Trail. There is a beautiful overlook and it would be easy for volunteers to see progress in this area.

Mapping

Using GPS units and ArcGIS software, a rough assessment of the property's current conditions was conducted. Distinctly different areas were mapped and are described in the following pages.

Land Cover Areas



Polygon	Cover Type	Acreage	Description
1	Goldenrod	5	Open field dominated by forbs. 75%+ goldenrod. 5-10% honeysuckle and buckthorn cover. Sparse trees include white ash, dogwood, red cedar. Amur maples are present.
2	Birch, Aspen, Ash	3	Largest trees are ~10" dbh. Canopy cover is 75%+. Very little NNIS. Honeysuckle is even getting shaded out and dying.
3	Meadow	11	Very open, wet. Occasional red cedar or ash. 50% honeysuckle. 10% Buckthorn. Some areas within polygon are worse than others. Amur maples present.
4	Ash, Oak, Elm	10	Canopy cover 40-50%. Honeysuckle represents ~30% in the mid-story. Largest trees ~7" dbh. Herbaceous layer includes goldenrod and more honeysuckle.
5	Ash, Oak, Elm	25	Canopy cover 50%. Honeysuckle represents ~50% of the mid-story and buckthorn comprises ~25% of the area.
6	White Pine	1	Canopy cover 40%. White pines appear to be dying. No herbaceous layer.
7	Ash, Oak, Elm	4	Slightly drier soils with Bur oaks, Elm and Ash. Heavy honeysuckle infestation and some Amur Maples present.
8	Meadow	4	More saturated soils. Extensive honeysuckle . Heavily overgrown.
9	Ash, Oak, Elm	3	Canopy cover 50%. Honeysuckle represents ~50-60% of the mid-story and buckthorn comprises ~25% of the area. Similar to polygon 5.
10	Sugar Maple	3	60% honeysuckle and buckthorn infestation on periphery of polygon 10. 70% canopy cover in center of polygon with few NNIS.
11	Ash, Oak, Elm, Maple	7	Canopy cover 70%. Canopy mostly made up of maple, bitternut hickory, and birch. Understory: honeysuckle infestation 30%, buckthorn infestation 15%.
12	Oak, Hickory	12	Dense maple stand – one extremely large maple surrounded by maple saplings and buckthorn seedlings. Canopy cover 75%. Understory: honeysuckle infestation 5%, buckthorn infestation 20%. Several small, isolated barberry plants.
13	Shrubs	3	Very few trees. Heavy honeysuckle and buckthorn infestation.
14	Honeysuckle	8	Shrub cover. Severe honeysuckle infestation 75% +.
15	Bitternut	3	90% canopy cover. Almost entirely comprised of bitternut hickory. A few birch scattered throughout area. 1% buckthorn understory.
Hedgerows		9	Hedgerow between wildlife meadow and Thorpe field. Canopy cover: 2%. Understory: Honeysuckle infestation 5% (one large shrub overgrown with grapevines – could be easily removed). Raspberries, thistle, grapevines, burdock.

Table 2: Summary of Annual Weed Management Activities

Species & Priority Level	Description	Distribution & Threats	Mgmt Objectives	Management Options & Recommendation
<p>Honeysuckle <i>Lonicera morrowii</i>, <i>tatarica</i>, and <i>x bella</i> (a hybrid of the first two)</p> <p><u>Priority level</u> MODERATE</p>	<p>Bush honeysuckles are deciduous shrubs that range from a few feet to 16 feet in height. The branches are widely spreading. The opposite, simple leaves (downy in <i>morrowii</i>) are oval to oblong in shape. Honeysuckle flowers are typically white or pink, and yellow with age. The fruit is a bright (one species has orange) colored berries that grow in pairs. Unlike the native honeysuckle (<i>Lonicera canadensis</i>, with solid white pith), non-native honeysuckle stems have brown pith that becomes hollow with age. Shrubby honeysuckles occur in abandoned fields and pastures, on wetland edges, and in forests, especially where soils are rich. They tolerate a wide range of soil moisture and light levels.</p>	<p><u>Distribution</u> Single plants and small infestations found throughout the forest.</p> <p><u>Threats</u> Shrub honeysuckles can rapidly invade natural communities by forming a dense shrub layer that decreases light availability and prevents the regeneration of many native woody and herbaceous plants. Although they thrive in full or partial sun, honeysuckles are able to grow and persist beneath a closed forest canopy. Honeysuckles spread vegetatively or sexually through fruits that are readily spread by birds and small mammals. Songbird nests built in honeysuckle experience higher predation than those in native shrubs.</p>	<p>Control honeysuckle in small, select patches each year.</p> <p>Allow no-net-increase in honeysuckle.</p> <p><i>Left uncontrolled, the honeysuckle will prevent any natural succession in the forest and field.</i></p>	<p>Whole-plant removal. Handpull small stems. For larger stems, consider using a weed wrench. This treatment, removes the roots and ensures that treated individuals will not re-sprout. However, soil disturbance and increased light availability may enable new seeds to sprout. In addition, most weed wrenches cannot accommodate plants with a stem diameter greater than 2.5 inches, and they are less effective for multi-stemmed shrubs such as honeysuckle.</p> <p>Stem cutting followed by covering the stump. This treatment removes plants without disturbing the soil. For best results, stems should be cut after spring leaf out and again in the fall because honeysuckle can re-sprout vigorously. In addition, stems should be cut close to the ground surface. Cover the stump with burlap or plastic, tied on securely. Shrub removal may increase light availability, releasing honeysuckle seedlings in the area or allowing new seeds to sprout.</p> <p>Stem cutting followed by application of glyphosate herbicide. Herbicide application kills the roots and prevents re-sprouting from the stump. Apply an appropriate herbicide in the summer or fall after cutting down the shrub.</p> <p><i>It is recommended to clear out the small infestations quickly, using a combination of hand pulling seedlings & cut stump treatment (either covering or herbiciding the stump). Herbicide use will increase cost, and will likely create a need for public education regarding safety concerns. However because it is an effective method, it is recommended.</i></p>
<p>Japanese Barberry <i>Berberis thunbergii</i></p> <p><u>Priority Level:</u> LOW-MODERATE</p>	<p>Small, spatula-shaped leaves, yellow flowers hanging below stems, and eventual red berries. Each leaf base has a single spine.</p> <p><i>Berberis thunbergii</i> is sold in numerous ornamental varieties (which differ in leaf color from gold to purple), but these ornamentals are capable of producing offspring with green leaves.</p>	<p><u>Distribution:</u> Several small- or moderate-sized barberry shrubs along Turkey Lane.</p> <p><u>Threats:</u> Quickly chokes out native species in forest understory.</p>	<p>Remove the small populations of <i>B. thunbergii</i> as soon as possible. At present, these infestations are easy to control, but if left unchecked they will be far more difficult to eradicate.</p>	<p>For the single plants on this property, hand-pull and then replant the disturbed area with native species. If these plants are left unchecked and allowed to grow into a larger infestation, cut the plants at their base in the early spring and late fall, then wrap the stump with burlap or thick plastic.</p>

<p>Purple Loosestrife (<i>Lythrum salicaria</i>)</p> <p><u>Priority level</u> LOW-MODERATE</p>	<p>Bright magenta flowers in the summer. Opposite, long, narrow leaves. Grows in dense clusters of stems in fields and wetlands</p>	<p><u>Distribution:</u> single plants and small clusters found alongside Roberts and Byington Trails.</p> <p><u>Threats:</u> Quickly invade marshy areas and choke out native species. Also, as the leaves decompose in water, they release large amount of tannic acid, which causes higher mortality rates in American Toad tadpoles.</p>	<p>Remove the small populations of <i>L. salicaria</i> as soon as possible. They are not well established now, and preventing their populations from growing within the park is a priority. This will be an easy task, since the infested areas are tiny in comparison with honeysuckle and buckthorn.</p>	<p>For these small infestations, hand-pull individual plants by grasping each stem at its base and pulling slowly, removing all the roots. If these infestations are allowed to get larger, the Vermont Department of Environmental Conservation's Water Quality releases beetles to remove plants.</p> <p>Leave pulled plants in a plastic garbage bag to decompose fully.</p>
<p>Common Buckthorn (<i>Rhamnus cathartica</i>) & Glossy Buckthorn (<i>Rhamnus frangula</i>)</p> <p><u>Priority level</u> MODERATE</p>	<p>Deciduous small tree Smooth, dull or shinygreen, sub-opposite leaves persist well into the fall, and twigs are often tipped with short, sharp thorns. Prefers neutral soils, and does not grow well in dense shade. Buckthorn produces prolific fruits, spread by birds.</p>	<p><u>Distribution:</u> Single plants and small infestations found throughout the forest.</p> <p><u>Threats:</u> Buckthorns readily invade natural areas, establish dense, even-aged thickets that crowd or shade out native plants.</p>	<p>Same as Honeysuckle</p>	<p>Whole-plant removal. Handpull small stems. For larger stems, consider using a weed wrench. This treatment, removes the roots and ensures that treated individuals will not re-sprout. However, soil disturbance and increased light availability may enable new seeds to sprout. In addition, most weed wrenches cannot accommodate plants with a stem diameter greater than 2.5 inches, and they are less effective for multi-stemmed shrubs such as honeysuckle.</p> <p>Stem cutting followed by covering the stump. This treatment removes plants without disturbing the soil. For best results, stems should be cut after spring leaf out and again in the fall because honeysuckle can re-sprout vigorously. In addition, stems should be cut close to the ground surface. Cover the stump with burlap or plastic, tied on securely. Shrub removal may increase light availability, releasing honeysuckle seedlings in the area or allowing new seeds to sprout.</p> <p>Stem cutting followed by application of glyphosate herbicide. Herbicide application kills the roots and prevents re-sprouting from the stump Apply an appropriate herbicide in the summer or fall after cutting down the shrub.</p> <p><i>It is recommended to clear out the small infestations quickly, using a combination of hand pulling seedlings & cut stump treatment (either covering or herbiciding the stump). Herbicide use will increase cost, and will likely create a need for public education regarding safety concerns. However because it is an effective method, it is recommended.</i></p>



PUBLIC OUTREACH AND EDUCATION

Management of invasive species in the park offers a rich opportunity to educate local residents and land management professionals about invasive plant management. This project will require public support, including volunteers, funding, and (likely) the consent for the use of herbicides. A thorough, well articulated plan that involves multiple partners will ensure that this project is successful. It also encourages private and public land owners to return to the areas they manage with the skills, knowledge, and attitudes necessary for taking action on their own properties.

The following objectives and tasks are recommended as methods for public outreach and education. While committee members have had wonderful success recruiting volunteers for the past two seasons, they would likely gain more headway if they included a more intensive outreach plan. Like other pieces of this management plan, outreach efforts will evolve as the project evolves.



The TNC Wise on Weeds! Coordinator is able to provide assistance in developing a weed management plan. She can also provide training for volunteers, and some support on work days. As funding becomes available, TNC will likely be able to provide additional support in the form of technical assistance and public education.

It is recommended that the committee members secure funding to help move the project forward. They could work with other town organizations (such as the Conservation Commission) to develop a town wide effort. For example, the groups could collaborate to:

1. Write grants to fund invasive related projects
2. Secure a stipend to support an invasive plant project coordinator. For example, \$1200 could support 75-100 hours of a person's time to develop outreach activities, recruit volunteers, fundraise, etc.
3. Hire Vermont Youth Conservation Corps time, purchase plant materials, recruit and support volunteers, pay for media outreach, and support additional TNC time.
4. Develop a plan to remove invasives from in front of the town hall, and replant with wildlife benefical.
5. Host public outreach designed to support volunteer efforts and increase the project's ecological impact
 - a. Local natural history workshops focusing on Valley Clayplain forest ecology



- b. Hands-on workshop for invasive species identification and removal, designed to kick-off the volunteer season;
 - c. Workshop about landscaping for wildlife enhancement—focus on removing and replacing invasive species
 - d. Do a community drive to get 10 households to commit to removing invasive species from their landscaping
6. Develop and present workshop and resources for Charlotte road crews so that they adopt wise road management practices that reduce the spread of invasive species. (TNC is currently working with Vermont Local Roads to host 3 such workshops in the state. We would like one of those to be in Charlotte.)
 7. Map the presence of invasives along roads and in other natural areas owned by the town or town related entities.
 8. Training a local person to be herbicide certified, as TNC staff will not always be available to oversee volunteer work days.
 9. Potentially hiring an herbicide contractor to do some of the invasives work. They are highly effective, and can clear invasives out much quicker than volunteers.

While park committee members have done a phenomenal job recruiting volunteers and hosting volunteer days, more work needs to be done to protect Charlotte's natural resources. Volunteer recruitment and management take persistence and continuity. The United Way has numerous tools for thinking about how to effectively manage a volunteer program. They also offer free or low-cost training session in volunteer management, and have a free service that matches volunteers with projects. Local schools and scout troops can also be wonderful sources of volunteer labor. The Nature Conservancy is available to work with a local coordinator to brainstorm sources for volunteer labor.

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Recommendations for Further Research

The following sites are quality references for referencing management options.

- <http://www.vtinvasiveplants.org>

The Vermont Invasive Exotic Plant Committee (VEIPC) website - Includes information about VEIPC activities, as well as a “Gallery of Invaders”, useful for identifying individual species and tips on management techniques.

- <http://tncweeds.ucdavis.edu>

TNC’s “Invasives on the Web” - Includes invasive species fact sheets, information on controlling invasives and a wide variety of invasive exotic species information.

- <http://www.vermontagriculture.com/invasive.htm>

The Vermont Department of Agriculture - Explains the Vermont plant quarantine rule and provides its entire text.

- www.nps.gov/plants/alien/factmain.htm

Plant Conservation Alliance - Illustrated, easy-to-read fact sheets on invasive alien plants with native ranges, plant descriptions, ecological threats, U.S. distributions & habitats, background of introductions, plant reproduction & dispersal, management approaches, alternative native plants, and other useful information.