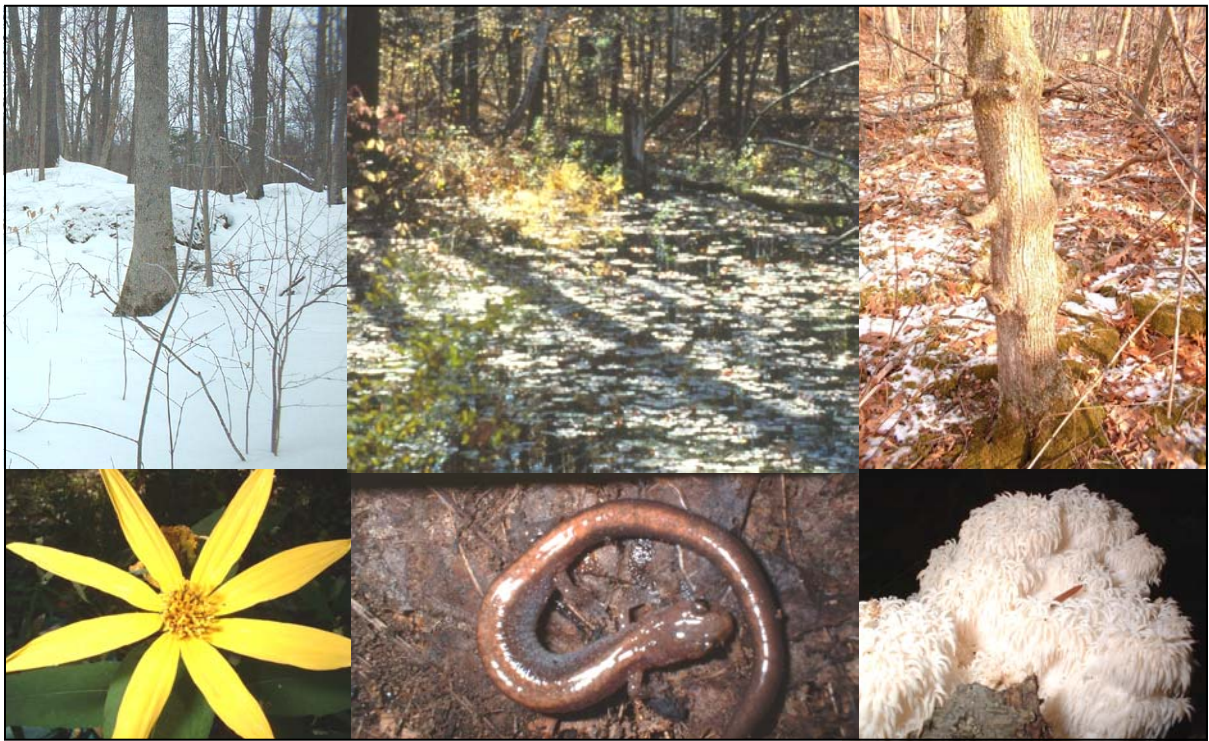


# Arms Grant Property Inventory, Assessment & Management Plan

Prepared by the Winooski Valley Park District

For the City of Burlington Department of Parks & Recreation



April 2003

Author: Brian Carlson

With assistance from Alicia Daniel, Elizabeth Thompson  
and the staff at the Winooski Valley Park District

Cover photos clockwise from top left:  
Outcrop in the winter (B. Carlson), Vernal pool (E. Thompson), Hophornbeam with imbedded barbed wire (B. Carlson),  
Fungus growing on dead birch log (B. Carlson), Red-backed salamander (B. Carlson), Harsh sunflower (B. Carlson)

The Winooski Valley Park District is a partnership between Burlington, Colchester, Essex, Jericho, South Burlington, Williston, and Winooski created to preserve urban natural areas for the purposes of wildlife conservation, education, and passive recreation.

## TABLE OF CONTENTS

ACKNOWLEDGMENTS .....	ii
EXECUTIVE SUMMARY .....	iii
INTRODUCTION .....	1
Conservation Legacy Program.....	1
Urban Wilds .....	1
ARMS GRANT PROPERTY DESCRIPTION .....	2
Location .....	2
Boundaries .....	2
Present Facilities .....	2
Surrounding Land Use.....	2
Regional Population Demographics .....	3
Socioeconomic Context of Property .....	3
Area History .....	3
RESOURCES OF THE ARMS GRANT PROPERTY .....	6
Physical Description.....	6
Current Value in Landscape Context .....	7
Natural Communities.....	7
Flora.....	9
Fauna .....	11
Recreational Resources .....	12
CONSERVATION PLANNING .....	14
Conservation Vision.....	14
Conservation Targets .....	14
Stresses and Threats to Conservation Targets .....	15
MANAGEMENT .....	17
General Management Discussion .....	17
Proposed Policies .....	17
Specific Management Tasks.....	18
REFERENCES.....	25

### APPENDICES:

1. Photos of the property
2. Interpretive guide to the property
3. Invasive species fact sheets
4. Contact information
5. Species lists
6. Copy of deed
7. Sample of natural areas boundary sign
8. CD with Text, Photos, and GIS data layers

### Note:

This document uses superscript numerals in the text to cite references located at the end of the document.

## ACKNOWLEDGMENTS

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The following document was used as an excellent guide in the development of this plan: Erdle, S. Y. 1999. Resource Management Plan for Grandview Nature Preserve. Natural Heritage Technical Report # 99-13. Virginia Department of Conservation and Recreation, Division of Natural Heritage, Richmond, VA.



Yellow lady-slipper  
*Cypripedium calceolus*



## EXECUTIVE SUMMARY

The 30.5 acre Arms Grant property is a unique piece of forested land with a diverse array of tree species, abundant rocky outcrops, and numerous small wetlands. The property is owned and managed by the City of Burlington's Parks and Recreation Department. This property is designated as an "Urban Wild" – a new land category introduced as part of the Conservation Legacy Program in 2002. This category applies to City properties that "provide habitat for rare and endangered plant and animal communities, wetlands and other riparian systems, floodplain, unique geological and hydrological features, important wildlife habitat and travel corridors, areas important for scientific research and education, scenic vistas, trails, passive recreation, sustainable forest communities, and cultural features."

This management plan was developed as part of the Burlington Conservation Legacy Program to guide future stewardship of the property and to provide a framework for future management plans for other Urban Wilds owned by the City.

The Arms Grant property fits many of the criteria of an Urban Wild. It provides habitat for seven species of rare plants, contains vernal pools that provide critical breeding habitat for spotted salamanders and other amphibians, and contains one of the most extensive and mature forests in Burlington. The property contains hiking trails that are used by Burlington High School and by many local residents.

Active management of the property is necessary to ensure that the unique ecological values of the property are not lost. This document provides many management recommendations to protect these ecological values and to increase the public's awareness and appreciation of the property. The highest priority recommendations are summarized below.

- Discontinue use of unauthorized trails on the property which pass over outcrop areas that are especially prone to erosion and provide habitat for rare plants. This may be the most difficult management objective to achieve. Also, do not widen any trails on the property.
- Initiate a control program for the invasive plant common buckthorn which is threatening to displace the native plant species found in this forest.
- Address the problem of encroachment onto the property. This involves three steps: (1) Clearly and permanently mark the eastern boundary; (2) Notify the homeowners along North Avenue who are storing items, dumping yard waste, cutting trees, or maintaining a lawn on the Arms Grant property that they are encroaching on City property. Request that they stop these activities and conduct follow-up visits to ensure compliance; (3) To avoid encroachment problems with future homeowners, post small signs along this boundary that indicate it is a city-owned Urban Wild.
- Install signs to promote the use and appreciation of the property. A welcome sign should be located at the main entrance point from behind the Burlington High School. This sign should include a list of use guidelines, a simple map or description of the trails, and a box used to distribute interpretive materials such as a brochure, or announcements about volunteer opportunities on the property. Along the property boundaries small signs should be tacked to trees that indicate that the land is a natural area owned by the City.

## INTRODUCTION

The 30.5 acre Arms Grant property is a unique piece of forested land with a diverse array of tree species, abundant rocky outcrops, and numerous small wetlands. The property is owned and managed by the City of Burlington's Parks and Recreation Department. This management plan was developed as part of the Burlington Conservation Legacy Program to guide future stewardship of the property and to provide a framework for management plans for other natural areas owned by the City.

### Conservation Legacy Program

In October 2000, the Burlington City Council adopted the 2000 Burlington Open Space Protection Plan. Following the recommendations of this plan, the Burlington Conservation Legacy Program was created.<sup>1</sup> One responsibility of this program is to develop management plans for unique natural areas within the Burlington Parks System.

### Urban Wilds

A new land category known as "Urban Wilds" was introduced as part of the Conservation Legacy Program in 2002.<sup>2</sup> This category applies to City properties that "provide habitat for rare and endangered plant and animal communities, wetlands and other riparian systems, floodplain, unique geological and hydrological features, important wildlife habitat and travel corridors, areas important for scientific research and education, scenic vistas, trails, passive recreation, sustainable forest communities, and cultural features."<sup>3</sup>

The proposed management goals for Urban Wilds lands are: (1) to preserve the natural features that make those lands unique; (2) to encourage compatible and appropriate levels of passive recreation; (3) to conserve the areas for the benefit of future generations.



## **ARMS GRANT PROPERTY DESCRIPTION**

### **Location**

The Arms Grant property is located in the northwest part of the City of Burlington, immediately north of Burlington High School (see Figure 1). Access to the property is limited to a network of trails that can be reached via the high school, the North Avenue Alliance Church on North Avenue, or the Burlington Bike Path.

### **Boundaries**

The 30.5 acre property is bounded by private properties that include a mix of forests, fields, and developed lands (see Figure 2). To the south the property ends at the northern edge of the Burlington High School property. The western boundary is the Episcopal Diocese Property that extends all the way west to the end of Lone Rock Point. To the north lies the property owned by the Elks Club. This property line starts at an iron post at the westernmost corner of the property (corner #1 on Figure 3), and follows the remains of an old barbed wire fence line all the way to the corner post of a chain link fence that surrounds a dumpster behind the Elks Club building (corner #2).

The eastern boundary is bordered by a large number of property owners. The North Avenue Alliance Church is the largest land owner on the eastern border. This property line extends from the fence post mentioned above, straight to an iron pin at the next corner (corner #3), following trees marked with blue plastic straps that appear to have been placed by a previous survey effort. From this corner pin, the property line turns 90 degrees to North Avenue. A narrow strip of the property directly borders North Avenue, but the Church has a right of way on that piece of land to use it as their driveway. The remainder of the eastern property line is bordered by eight individual residential property owners. This property line section, currently unmarked with any permanent markers, runs parallel to North Avenue, 150 feet from the edge of the street. At the south corner of the eighth lot (corner #5), the property line turns 90 degrees, along the boundary with the Burlington High School. The next property corner (#6) marks the beginning of the boundary with the Episcopal Diocese property. There are no visible permanent markers on this corner or along this line, but there are traces of fence lines that appear to follow the property boundary.

### **Present Facilities**

Well-established trails totaling  $\frac{3}{4}$  mile cross through the property (see Figure 3). There are no “official” access points for these trails; however, by parking at the North Avenue Alliance Church or Burlington High School, one can easily access the property. Currently, there is also a trail from the Burlington Bike Path that leads into the Arms Grant property. There are no signs anywhere on the property that indicate it is City property, nor are there signs that indicate any trail use guidelines, where the trails lead, or how long they are. No permanent structures of any kind exist on the property.

### **Surrounding Land Use**

To the south and north, the property is bordered by a narrow band of forest. To the west, the property is bordered by a much larger expanse of forest that stretches all the way across the Burlington Bike Path to the end of Rock Point. To the east, the property is bordered by an open field, a gravel parking lot, and several residential lots. Beyond the immediate borders of the property, dense residential development characterizes the land use to the



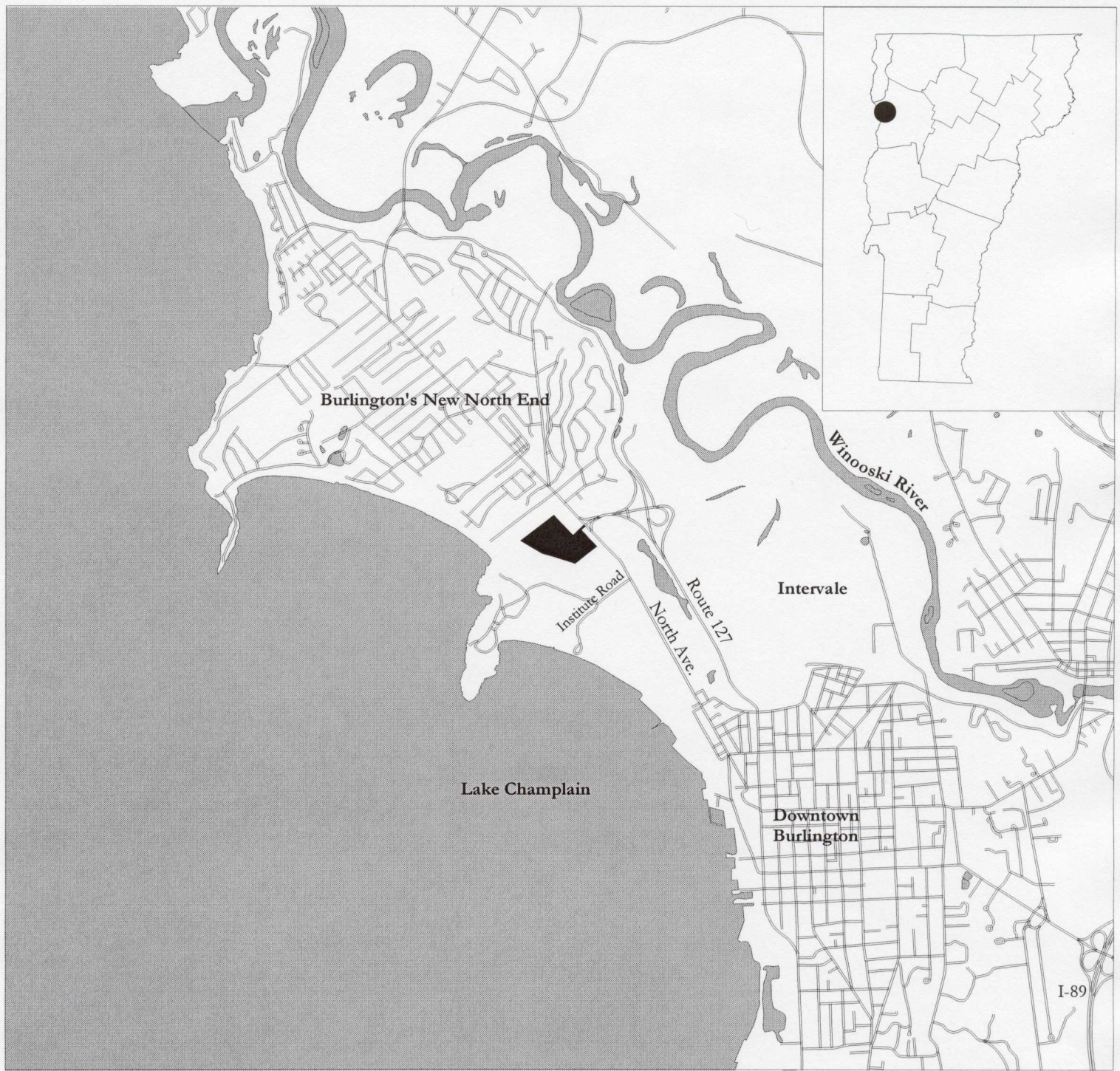


Figure 1. Location Map

Legend

 Arms Grant Property

0.5 0 0.5 Miles



Map produced March 2003




Winooski Valley Park District







Figure 2. Adjacent land ownership

- Legend
-  Arms Grant Property
  -  Burlington Tax Map Parcels

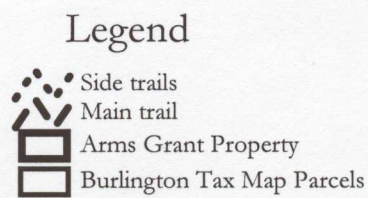


Digital Orthophoto scale: 1:1250, date: 2000  
 Trail locations are estimated to be accurate within 50 feet.  
 Map produced March 2003

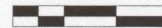




Figure 3. Property Boundaries and Trails



100 0 100 200 Feet



Digital Orthophoto scale: 1:1250, date: 2000

Trail locations are estimated to be accurate within 50 feet.

Map produced March 2003



Winooski Valley Park District





north and northeast. A large, minimally developed tract of land known as the Intervale is located to the east, across North Avenue. To the south lies a large cemetery and more residential development.

### **Regional Population Demographics**

The City of Burlington is the state's most populous city with 39,824 inhabitants according to the 2000 Census. The City is the economic center of Chittenden County (pop. 146,571). The population of the City has increased slightly in recent years, roughly 1.6% per year. However, the population of the County is growing rapidly, with 11.24% growth from 1999-2000, and a 96% increase between 1960 and 2000!<sup>4</sup>

### **Socioeconomic Context of Property**

This property, located within City limits, provides an accessible natural area for the residents of Burlington and surrounding communities as well as visitors to the area. There are no fees to access the property. Burlington Bike Path users can easily access this property via a trail that passes through the Elks Club and Episcopal Diocese Properties. Tourists and residents visiting North Beach can reach the property via the trails behind Burlington High School. The Arms Grant natural area is readily accessible to numerous residents in nearby neighborhoods. A city bus-stop at the high school makes the property accessible to anyone making use of the public bus system.

### **Area History**

#### **General land use history**

Before the first European settlers moved into the area, it is possible that the forest of the Arms Grant property was used as a hunting ground by Abenakis, based on evidence found nearby at Rock Point<sup>5</sup>. With the arrival of European settlers, most of the forests were cleared for timber and fuel and to make room for agricultural uses. The numerous rocky outcrops on the Arms Grant property prevented tilling, but it is likely that it was cleared and used as pasture land by early settlers.

An area of 350 acres, including the Arms Grant property, was managed as the Arms Dairy Farm from approximately 1922 to 1962. According to a Burlington Free Press article, in 1955 there were 13 farms in Burlington, with a total of over 2,500 acres of land. The Willard Arms' farm had 120 head of Jerseys.<sup>6</sup>

Air photos taken in 1937 show that the Arms Grant Property was mostly forested at that time, although it was more open than it is today. To the northwest and northeast of the property, the land was entirely open farmland, in contrast to the residential housing that exists in those areas today. By 1962 many of the homes bordering the property on North Avenue and Killarney Drive had been built, but the forest on the property was still quite open. The open forest seen in the 1962 air photos tells us that the forest on the property was probably used for grazing of cattle for the years that the farm was in operation. With the conveyance of the Arms Grant Property to the City in 1962, the forest has had 40 years to recover from the effects of grazing. There are still many signs of its use as farmland, such as old fence posts and pieces of barbed wire imbedded in tree trunks.

In February 2003, several tree cores were obtained to document the age of some of the trees on the property (see Table 1). Trees were cored as close to the ground as possible, in order



to obtain the most accurate ages. In some cases the tree diameter was too large to obtain a complete core (i.e. trees with dbh >20 inches). In those cases, estimates were made based on the average ring width of the core. The oldest tree cored, and perhaps the oldest on the property, is a large white oak that presumably marks the property line with the Episcopal Diocese. Its approximate age (200+ years) was estimated based on the growth rate of a smaller, adjacent white oak. If this estimate is accurate, this tree started growing in the early 1800s.

The ages of the white pines in Table 1 points to the approximate dates when various cleared areas were abandoned as agricultural land and allowed to become reforested. At roughly 100 years old, the oldest white pines are just reaching ‘middle age’, and can be expected to reach 250 years of age if they remain healthy. The scattered hemlock trees on the property will not even be considered mature trees until they reach 250 years old and they could potentially live another 600 years! The fact that none of the trees on the property date back into the 1700s suggests that at one point, probably in the late 1700s, the entire property was cleared of trees. During the following century, the forest grew back but was probably selectively logged several times, so very few trees approach 200 years of age.

Table 1. Results of tree coring in 2003 on the Arms Grant Property.

Tree species	Location	DBH* (in)	Approx. age
White pine	Single pine on outcrop in center of property	16.5	85-90
White pine	Pine stand near N. Ave. Alliance Church	18	85-90
White pine	Pine stand near Diocese boundary	24	105-110
White pine	Pine stand near BHS boundary along main trail	19	68-73
Hemlock	Outcrop near main trail	19.5	120-130
Red oak	Near Diocese boundary	25	105-115
White oak	Near Diocese boundary	17.5	70-75
White oak	Near Diocese boundary	38.5	200+

\*Diameter at breast height

### Acquisition history

The following timeline traces the ownership of the Arms Grant Property back to the mid 1800s. The volume and page numbers refer to the City of Burlington land records on file at the City Clerk’s office in City Hall. The existing parcel owned by the Department of Parks and Recreation was once part of the large Arms dairy farm. The owners of the farm for many years, Willard and Florence Arms, were prominent figures in the local community. Florence was an avid writer and spoke out about the importance of maintaining urban natural areas.

1868: Property conveyed from Thaddeus A. Fletcher to Phillip V. Manwell.  
(Vol 4, p. 56)

1909: Agreement as to fence line between Ester Manwell Kingsland and the Vermont Episcopal Institute. This document refers to the plan in Vol 51, p. 511.  
(Vol 59, pp. 612-613)

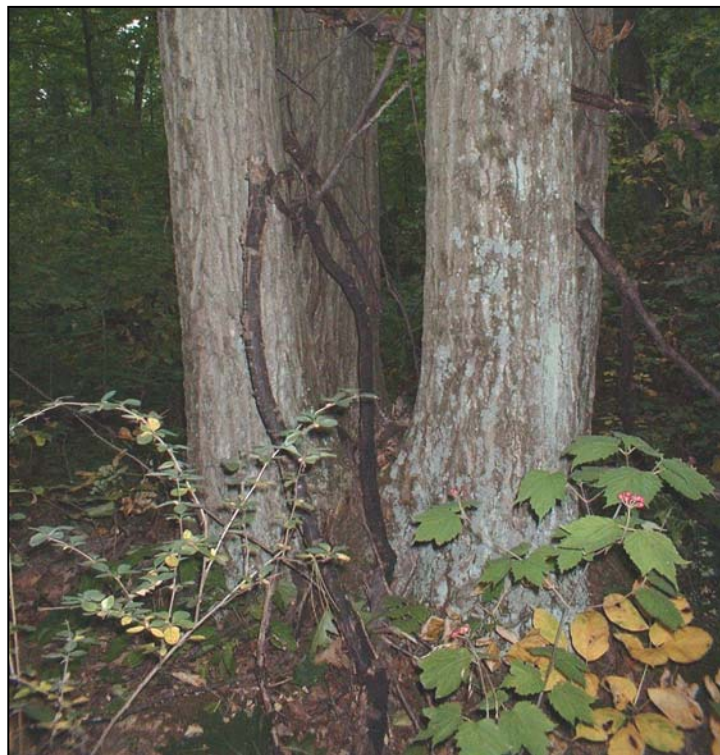
1922: Property of 350 acres conveyed from the Estate of Ester Kingsland (married to Phillip V. Manwell) to Willard C. Arms for the amount of \$19,500.  
(Vol 79, pp. 614-615)

1946: Four small parcels along North Avenue conveyed from Willard C. and Florence C. Arms to Ralph R. and Christine B. Thayer. (Vol 126, p. 59)

1958: Property conveyed from Willard C. and Florence C. Arms to Gordon Page. (Vol 154, pp. 471-472)

1958: Property conveyed from Gordon Page to Lakeview Heights, Inc. (Vol 154, p. 740)

1962: Property conveyed from Lakeview Heights, Inc. to the City of Burlington. (Vol 164, p. 179)



Four red oak trees(*Quercus rubra*) sprouting from a single stump probably cut in the early 1900s. photo: B. Carlson

## **RESOURCES OF THE ARMS GRANT PROPERTY**

A variety of methods were used to gather information about the resources of the property during the period of September 2002 to March 2003. These methods included a plant species inventory, natural community assessments, wildlife tracking, literature searches, interviews with adjacent landowners and property users, and consultation with regional experts in various natural resource fields. While the vascular plant inventory was quite thorough, it was performed late in the growing season. More species may be found during the spring and early summer months. Recommended future work includes more bird, invertebrate, fungi, and bryophyte inventories since these subjects were not thoroughly covered by the information gathering for this report.

### **Physical Description**

#### **Topography**

The property elevation ranges from a low point at the northwest edge of the property of 180 feet to a high point of 245 feet at the southeast edge of the property (see Figure 4). The property is characterized by a series of rocky outcrops, gentle slopes, small seeps, seasonal streams, and vernal pools. Broad, gentle slopes carry runoff away on the southwest side of the property. The rest of the property drains through small channels, and some runoff collects in vernal pools.

#### **Geology**

Dunham dolomite is the dominant bedrock type found on the property.<sup>7</sup> Even a brief walk along the main trail through the property provides ample opportunity to observe many outcrops of this calcium-rich rock. The abundance of this dolomite creates soil conditions that are capable of supporting many species of plants that require soils rich in calcium and other plant nutrients. The surficial geology of the site is characterized by sediments deposited after glaciers receded from the region. Roughly 12,000 years ago, a salt water sea occupied the Champlain Valley and covered much of the Greater Burlington area. The Arms Grant property was covered with deposits of pebbly marine sands, unlike the higher elevations further east in the County which were buried in a layer of glacial till.<sup>8</sup>

#### **Soils**

Two soil types characterize most of the property. Farmington loams occupy the steeper slopes and rocky outcrops while the gentle slopes and depressions are characterized by the Duane and Deerfield soils. Farmington soils are typically very shallow and rocky, and are therefore unsuitable for crops or development. The Duane and Deerfield soils tend to be very sandy and to have a seasonally high water table, and therefore they are also not suitable for crops or development.

#### **Climate**




Burlington (as measured at the Burlington International Airport) has a temperate climate with the mean maximum temperature in July of 80.7°F and mean maximum temperature in January of 25.5°F. The mean annual precipitation in Burlington is 34.4 inches, with a mean snowfall of 81.0 inches. Average annual windspeed in Burlington is 9.6 mph.<sup>9</sup> At the Arms Grant property, the combination of a relatively moderate climate (by Vermont



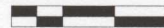


**Figure 4. Topography**

**Legend**

-  5 foot contour intervals
-  Trails
-  Arms Grant Property

100 0 100 200 Feet



Digital Orthophoto scale: 1:1250, date: 2000

Trail locations are estimated to be accurate within 50 feet.

Map produced March 2003



Winooski Valley Park District





standards) and limestone bedrock, translate into a unique forest community that includes a number of tree species that are generally found in more southerly forests.

### **Current Value in Landscape Context**

As a relatively large forested parcel in the midst of residential and urban development, this property provides a critical link in the chain of natural areas in Burlington. It is clear from Figure 5 that the Arms Grant property is part of a much larger piece of forest extending all the way to the end of Lone Rock Point. This large forested area is bordered by North Avenue, but just to the east of this roadway hundreds of acres of open land are located in the Intervale. While the road certainly provides a barrier for some ecological processes (such as for dispersal of very small animals), larger animals as well as seeds and pollen can move across it. In a 1993 report,<sup>10</sup> the Arms Grant property forest combined with that of Lone Rock Point was rated as one of the top three sustainable forest communities in Burlington based on its size and condition.

### **Natural Communities**

One way to describe and classify natural areas is to identify the area's natural communities. Understanding an area's natural communities allows one to better understand patterns in the land and can help in the management of that land. In this document the natural community types are drawn from the book "Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont."<sup>11</sup> Figure 6 illustrates the boundaries of the different natural communities and variations within the communities on the Arms Grant property. The "patches" that are shown on Figure 6 are not drawn directly from "Wetland, Woodland, Wildland". Rather, these variations were developed specifically for this project to help distinguish some of the differences that are observed in the forest on the property. The following text describes these natural communities and variations. Approximate size of each type occurring on the property is included in parentheses.

#### **Mesic maple-ash-hickory-oak forest (24 acres)**

This is the dominant natural community type found on the property. This forest type is found in the areas of Vermont, like the Champlain Valley, with a slightly warmer climate. While some of the typical northern hardwood forest species like sugar maple (*Acer saccharum*) and white ash (*Fraxinus americanus*) are present, the forest is also characterized by many trees that are more often found in forests south of Vermont. These species include shagbark hickory (*Carya ovata*) and white oak (*Quercus alba*). Within this natural community there are a couple of small patches (0.1 acre) of forest dominated by beech trees (*Fagus grandifolia*) with very little diversity in the understory. One 0.5 acre patch has a high percentage of hemlock trees mixed in with the hardwoods. Along the boundary with the Episcopal Diocese there is an area of about 0.5 acre that is dominated by white (*Pinus strobus*) and red pine (*Pinus resinosa*). This area was probably an agricultural field that was abandoned sometime in the late 1800s or early 1900s.

#### **Transition hardwoods limestone forest (5 acres)**



This natural community is found on rocky outcrops. The outcrops, with their shallow soils and calcium-rich bedrock close to the surface, provide the ideal conditions for a unique type of forest. Known as a Transition hardwoods limestone forest, these outcrop areas on the property are characterized by trees that are usually found in the southern part of the state, such as shagbark hickory. This community includes a large number of herbaceous plants that require high levels of calcium, including wide-leaved sedge (*Carex*










**Figure 5. Landscape Context**

**Legend**

-  Roads
-  Arms Grant Property

**Land Use**

-  Agricultural land, parks, other open space
-  Wetland
-  Forested land
-  Urban land
-  Winooski River and Lake Champlain

0.2 0 0.2 Miles 

Roads and Land Use coverage provided by the  
City of Burlington Dept. of Planning and Zoning  
Map produced March 2003



Winooski Valley Park District







**Figure 6. Natural Communities and Rare Plants**

- Legend**
- Arms Grant Property
  - Trails
  - Rare plant locations**
    - Poke milkweed
    - Four-leaved milkweed
    - Yellow lady-slipper
    - Panicked tick trefoil
    - Sweet joe-pye weed
    - Harsh sunflower
    - Squarrose goldenrod

**Natural Communities**

The unshaded area within the property boundary is Mesic-maple-ash-hickory Forest

- Transition hardwoods limestone forest (outcrops)
- Beech patch
- Hemlock patch
- White pine patch
- Seep
- Shrub swamp
- Vernal pool
- Overgrown field

100 0 100 200 Feet



Digital Orthophoto scale: 1:1250, date: 2000  
Trail locations are estimated to be accurate within 50 feet.  
Map produced March 2003



Winooski Valley Park District





*plantaginea*), early meadow rue (*Thalictrum dioicum*), and blunt-lobed hepatica (*Hepatica americana*). Some of the rare plants on the property, such as the yellow lady slipper (*Cypripedium calceolus* var. *pubescens*) and squarrose goldenrod (*Solidago squarrosa*), are found primarily in this community.

The land occupied by this natural community type is generally too rocky to be valuable for farming or development. However, adjacent development can indirectly affect the sustainability of these natural communities. When areas between the outcrops are cleared for roads or buildings, natural processes such as seed dispersal can be disrupted which can lead to the long term decline of this natural community type. The diverse plant species found in this community are also threatened by invasive shrub species such as common buckthorn (*Rhamnus cathartica*) which can become so dense that young seedlings and native shrubs and herbs are shaded out.

### **Wetlands**

Although the property is virtually entirely forested, a number of wetlands are scattered throughout the woods. These wetlands range from pools with several inches of water during the spring months (Vernal pools), to forested areas with saturated soils and very little standing water (Seeps).

#### **Vernal pools (0.1 acres)**

Vernal pools are wetlands that typically fill with water during the spring months and gradually dry out as the summer progresses. Even though these pools make up a very small portion of the landscape, they are absolutely critical for the survival of certain amphibian species. The pools provide breeding habitat for spotted salamanders, wood frogs, and spring peepers. The seasonal nature of these pools keeps them free of fish which prey heavily on eggs and young amphibians. Since these pools are so small and do not have any flow of water through them, they are especially susceptible to pollution. Dumping of lawn waste in the vicinity of the pools can negatively impact water quality in the pools, especially if herbicides or fertilizers have been used on the lawn.

#### **Seeps (0.6 acres)**

These wetlands occur in areas where groundwater comes very close to the surface. The forest canopy is unbroken in these areas because they are quite small. The soil, though not always saturated or flooded, shows characteristics of wetland soils. Seeps can have traces of open water, but generally do not have large, open pools like vernal pools. Another difference between these wetland types is that seeps are characterized by flowing groundwater, while vernal pools do not have any flow. Seeps tend to have a larger number of red maple trees (*Acer rubrum*) which are more tolerant of flooded soils, and include many wetland herbaceous plants such as sensitive fern (*Onoclea sensibilis*).

#### **Shrub swamp (0.5 acres)**

This wetland type occurs on the Elks Club property, immediately adjacent to the Arms Grant property. It is included in this document because management activities on the Arms Grant property will affect this community. Much of the water that runs off the Arms Grant property drains into this wetland. It contains a variety of wetland herbaceous plants and shrubs. Some of these species include speckled alder

(*Alnus rugosa*), silky dogwood (*Cornus amomum*), skunk-cabbage (*Symplocarpus foetidus*), and clearweed (*Pilea pumila*).

### Overgrown field (0.1 acres)

A small field that is growing in with young trees occurs along the main trail at the edge of the property boundary with the high school. Only a tiny portion of this old field occurs on the Arms Grant property. This field is not considered a 'natural' community because it has been maintained as a field only through human activity. Without active management for roughly the past 20 years, it is on its way to reverting to forested land.

### Flora

The Arms Grant property contains a remarkably diverse group of plant species. In the short field season used for this report, 150 plant species were documented from the property. This number represents roughly 10% of all the native plant species found in Vermont (1500 species<sup>13</sup>) – an impressive figure considering that the property covers less than 0.001% of the land area of the state. This diversity is due to a variety of factors including the calcium-rich bedrock, the mixture of outcrops and vernal pools, and the relatively warm climate of the Champlain Valley. The 150 plant species found on the property include seven rare species (see Table 2 and Figure 6). These plants are described below and color photos are provided in Appendix I.

Table 2. Rare plants found on the Arms Property in 2002.

Common name	Scientific name	State/Global Rarity Rank*	Abundance on the site in 2002
Harsh sunflower	<i>Helianthus strumosus</i> L.	S2S3/G5 Threatened	180 stems
Squarrose goldenrod	<i>Solidago squarrosa</i> Muhl.	S2S3/G4?	8 plants
Yellow lady-slipper	<i>Cypripedium calceolus</i> var <i>pubescens</i> (Willd.) Correll	S3/G5	53 plants
Poke milkweed	<i>Asclepias exaltata</i> L.	S3/G5	2 plants
Four-leaved milkweed	<i>Asclepias quadrifolia</i> Jacq.	S3S4/G5	4 plants
Sweet joe-pye weed	<i>Eupatorium purpureum</i> L. or <i>E. fistulosum</i> Barratt	S2/G5?	1 plant
Panicled tick trefoil	<i>Desmodium paniculatum</i> (L.) DC.	S3/G5	6 plants

\*see Appendix V for a description of rarity ranks.

### Harsh sunflower *Helianthus strumosus*

Harsh sunflower is a Threatened species in Vermont (10 VSA Chap 123). This wildflower thrives in areas of the forest with slight openings in the canopy where more light penetrates to the forest floor. Perhaps for this reason, the largest cluster of Harsh sunflower plants is found immediately adjacent to the main trail. As a perennial this species will sprout in the same location year after year. The plants also produce seeds, making them capable of spreading through the forest. The greatest threat to these plants is trampling and cutting. For this reason property managers should be aware of the locations of these plants along the trails in order to avoid inadvertently cutting them while maintaining the trails. The property managers should monitor the trails to ensure that they do not widen at the sites of these plants, causing them to be trampled.

**Squarrose goldenrod** *Solidago squarrosa*

Although many goldenrod species are found in old field settings, this rare species is found in forests. It can be distinguished from more common goldenrod species by the presence of flowers along much of the stem (not just at the top) and the green, spreading bracts on each flower head. The plants are easy to spot in the winter because the flowering stem remains intact through the winter and sticks up through the snow, unlike most wildflowers that are matted down by snowfall. The plants on the Arms Grant property are scattered widely, occurring only individually or in groups of two or three plants. Since this perennial wildflower is not extremely abundant on the property, trampling of existing plants threaten the population. These plants may also be threatened by shading and competition that results from dense growth of invasive species such as common buckthorn.

**Yellow lady-slipper** *Cypripedium calceolus* var. *pubescens*

This yellow orchid is quite abundant in the Arms Grant property forest, especially on the rocky outcrop areas. At first glance, when not flowering, this plant is quite similar to the much more common pink lady-slipper. However, the yellow flower and stem leaves distinguish the yellow lady-slipper from the pink lady-slipper. No pink lady-slipper plants have been found on this property. They typically are found in acidic soils, unlike the yellow lady-slipper, which tends to be found in soils rich in calcium. These perennial wildflowers invest their energy into a single flower each year, so their reproductive rate is quite low. New trails spreading through the forest, especially on the outcrops, threaten these plants because they cannot withstand being walked on or ridden over by foot or bike traffic.

**Poke milkweed** *Asclepias exaltata*

This rather large plant can grow to a height of six feet. It is a perennial wildflower with white, drooping flowers. The greatest threat to this plant is probably the shading and competition that results from dense growth of invasive species such as common buckthorn.

**Four-leaved milkweed** *Asclepias quadrifolia*

This perennial plant usually has leaves in whorls of four and pink or white flowers that are in a loose, but upright cluster. The greatest threat to this plant is probably the shading and competition that results from dense growth of invasive species such as common buckthorn.

**Sweet joe-pye weed** *Eupatorium purpureum* or *E. fistulosum*

More specimens of this plant on the property need to be found and examined (preferably when flowering) in order to conclusively determine which species it is. The sole specimen located in 2002 appeared to have characteristics of both species. Both species are rare in Vermont, but *E. fistulosum* has not been observed in the state for many years, so the positive identification of the species is very important.

**Panicked tick trefoil** *Desmodium paniculatum*

This rare plant has small purple flowers and narrow leaves. It is quite distinct from the showy tick trefoil (*D. canadense*) which has rounder oblong leaves and extremely sticky mature seed pods. The greatest threat to this plant is probably the shading and

competition that results from dense growth of invasive species such as common buckthorn.

## Fauna

As a large, mature forest within Burlington's city limits, properties such as this one provide habitat for a number of wildlife species that would otherwise not be found in an urban area. Many bird species require more than just a few trees along a lawn's edge, and many amphibians require wetlands surrounded by mature forest. With the mix of upland forest, small wetlands, and the property's connection to the larger Lone Rock Point forest, this property provides excellent wildlife habitat. A few species and groups of wildlife are discussed in more detail below:

### Reptiles and amphibians

The spotted salamander (*Ambystoma maculatum*) is one of the most notable species that is known to occur on this property. Although spotted salamanders are not considered to be especially rare in Vermont, they are a fascinating species and their presence indicates a healthy ecosystem. These salamanders require temporary wetlands - vernal pools - to breed each spring. On the first rainy nights of early spring these salamanders migrate from the forest to vernal pools. They congregate in the pools for a few weeks, often in large numbers, to breed and lay gelatinous masses of eggs. The aquatic larvae mature in the pools, then migrate to the adjacent forest before the pools dry up in midsummer.



Spotted salamander heading back into the forest after laying eggs.  
photo: B. Carlson, taken in Colchester.

Although the adult salamanders are up to eight inches long with bright yellow spots, they are not easy to find. They spend most of their time under logs or in underground tunnels and burrows created by other animals. Many threats face this species. The most widespread threat is the destruction of their habitat. The small vernal pools that provide breeding habitat for these creatures are often not recognized as wetlands and are filled or built upon by expanding developments. Sometimes while the pools are conserved, the surrounding forests become housing developments or roads, thus destroying the adult habitat of the salamanders, or making it impossible for the adults to reach the pools in the spring. Pollution of the vernal pools also threatens these salamanders because if the water quality is poor, the eggs may not develop normally. These wetlands also provide breeding habitat for wood frogs (*Rana sylvatica*), and probably spring peepers (*Pseudacris crucifer*).

The forest with its abundant woody debris and loose rocks provides good habitat for red-backed salamanders (*Plethodon cinereus cinereus*) as well as garter snakes (*Thamnophis sirtalis sirtalis*). Other species that could be found on the property include gray tree frog (*Hyla versicolor*), American toad (*Bufo americanus*), milk snake (*Lampropeltis triangulum*), northern brown snake (*Soreria dekayi*), red-bellied snake (*Soreria occipitomaculata*), and ring-necked snake (*Diadophis punctatis edwardsii*).

## **Birds**

The mature forest, with a variety of trees species and a variety of tree ages, provides habitat for many forest bird species. Signs of owls and winter flocks of chickadees, titmice, white-breasted nuthatches, and hairy and downy woodpeckers were observed in the winter months of 2002-2003. A list of species observed on the property can be found in Appendix V. This list includes only observations from winter months, therefore it does not include the large number of warblers and other summer-only species that are certain to rely on the forest for nesting habitat. Many bird species that are likely to occur on the property nest on the ground or very close to the ground. A list of these potential species is found in Appendix V. This long list of ground-nesting birds is a good reason to prevent dogs from roaming off-leash through the woods where they could easily disturb these nesting birds.

## **Mammals**

Signs of deer (*Odocoileus virginianus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), gray squirrels (*Sciurus carolinensis*), mice (*Peromyscus* sp.), and voles (*Microtus* sp.) are common on the property. Fisher (*Martes pennanti*) have been seen in the nearby Rock Point forest<sup>15</sup>, so it is likely that they use the Arms Grant property forest as well. Other likely species include porcupines (*Erethizon dorsatum*), and northern flying squirrels (*Glaucomys sabrinus*). See Appendix V for a list of observed and potential species on the property.

## **Recreational Resources**

The property provides a variety of recreational opportunities. Such recreational resources are an important aspect of open space in urban areas, and in an Urban Wild they should be maintained as long as they are compatible with the unique natural resources.

Several unimproved trails cross through the property (see Figure 3). These trails have a combined distance of about  $\frac{3}{4}$  mile. The widest and most heavily used trail runs from the Burlington High School through a corner of the Episcopal Diocese Property to the Burlington Bike Path. Narrower side trails lead from this main trail to the residences on North Avenue, to the North Avenue Alliance Church, and to the Elks Property and the residences on Killarney Drive. A newly created network of narrow trails is located in the northwest corner of the City property, extending onto the Elks Club and Episcopal Diocese properties. These trails appear to be heavily used by mountain bikers, judging by the tire tracks, high levels of erosion, and bike obstacles/bridges built along on these trails.

The trails on the property are used frequently by walkers, bikers, skiers, and runners. Initial surveys of trail use in October 2002 commonly found 5 users per hour during daylight hours of weekend days. The high school also uses the trails for their cross-country running race course and they use the property for biology and physical education classes. The main trail is well-suited for the multiple forms of use that currently occur on it. It is wide enough to allow bicycles to pass each other; there very few blind corners; and the trail surface appears to be able to withstand frequent use. However, the side trails, especially those on the outcrops on the northwest side of the property, are extremely prone to erosion. Continued use will damage the plants, including rare species, which grow on the forest floor in the vicinity of these trails.

In an August 2000 survey, 665 users in a single day were reported from the Burlington Bike Path where it crosses Shore Road. Given this high use, there is great potential for an increase in use of the property's trails if a sign along the Burlington Bike Path made users aware of the trails. This type of advertisement is not recommended. While the main trail on the property is capable of handling moderate levels of use, it would become overcrowded if a large percentage of Burlington Bike Path users began to use it as well. There is presently no access to the City property from the bike path without passing across the Elks Club and Episcopal Diocese properties.



Squarrose Goldenrod  
*Solidago squarrosa*

## CONSERVATION PLANNING

The process of conservation planning involves an analysis of the ecological characteristics of a property along with the human uses of that property and the interactions between the ecological and human aspects. The goal of this process is to identify the conservation targets and threats to those targets. These stresses and threats are then addressed through specific management actions and policies for the property. Of course management actions may also address issues of general property management that are not directly related to the conservation planning issues. This section begins with a Conservation Vision that presents the future state of the property. This vision is based on the ecological and recreational resources of the property and the stated purposes of Urban Wild areas.

### Conservation Vision

The forest on this property will be an even more impressive resource in 50-100 years. Most trees will be in the 150-200 year age range, with many over 200 years old. The forest floor will have large amounts of woody debris – large branches and fallen trees – which will increase the diversity of habitat available to wildlife. The many rare plants species currently found in the forest will still be present, though they may not be in precisely the same locations. Vernal pools are protected from disturbance and pollution, and continue to support healthy populations of amphibians. Active management controls invasive shrub species in the forest. The majority of visitors to the property remain on the main trail through the property.

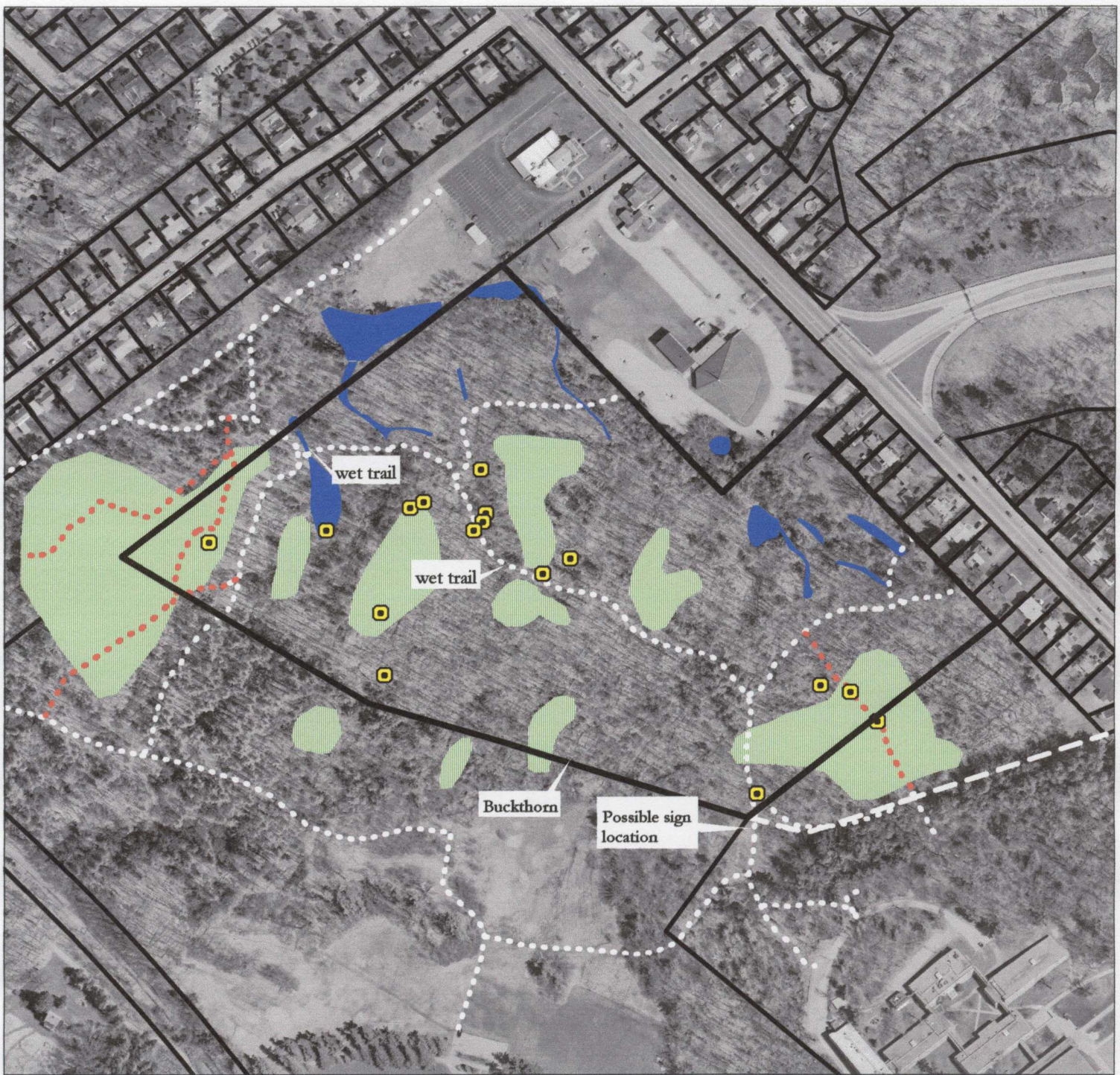
### Conservation Targets

While it is helpful to prioritize natural features that are most unique and sensitive in a given area, this prioritization does not imply that the rest of the natural features on the property are not important and worthy of protection. After all, the entire ecosystem is required in order to support all of the various species that are found in it. With limited resources, however, it is necessary to designate specific areas that are more sensitive than others so that management decisions can focus on protecting those areas.

The conservation targets on this property include:

1. Rare plants. Although only one of the rare plant species on the property (harsh sunflower) is listed as Threatened, and therefore protected by Vermont State law, the other species are rare enough that their protection is encouraged by the Vermont Nongame and Natural Heritage Program.
2. Wetlands. All wetlands are considered sensitive features because they are especially unique areas of the property and provide habitat for a different suite of plant and animal species. The vernal pools are especially important because they are absolutely essential to the local populations of some amphibian species. For example, if these pools are destroyed or polluted, spotted salamanders could disappear completely from the Rock Point/Arms Grant area.
3. Rocky outcrops (see Figure 7). The rocky outcrops are sensitive areas because their unique suite of plant species can be easily disrupted by excessive use and resulting erosion.





**Figure 7. Conservation Targets & Management Recommendations**

- Legend**
- Conservation Targets
    - Outcrop Forest
    - Wetland
    - Rare Plants
    - Trails to be closed
    - Trails
    - Proposed boundary change
    - Arms Grant Property
    - Burlington Tax Map Parcels

100 0 100 200 Feet



Digital Orthophoto scale: 1:1250, date: 2000

Trail locations are estimated to be accurate within 50 feet.

Map produced March 2003



Winooski Valley Park District





## Stresses and Threats to Conservation Targets

### Invasive species

Throughout natural areas of the entire country, invasive exotic plant and animal species are becoming a growing problem. These are species “which have been purposefully or accidentally introduced outside their original geographic range which are able to proliferate and aggressively alter or displace native biological communities.”<sup>14</sup> The forest of the Arms Grant property is susceptible primarily to the invasive shrub species that are able to creep into forests from adjacent clearings and backyards.

Five invasive species of concern have been found on the property: Common buckthorn (*Rhamnus cathartica*), Japanese barberry (*Berberis thunbergii*), multiflora rose (*Rosa multiflora*), Norway maple (*Acer plantanoides*), and honeysuckle (*Lonicera* sp.). To varying degrees, these woody species have the ability to dominate the understory (or canopy in the case of Norway maple) of a forest and prevent native herbaceous plants, shrubs, and tree seedlings from growing. They are very difficult to remove and control, but right now they are found mostly around the edges of the property, so there is an opportunity to control them. Common buckthorn is among the most invasive species that are currently found in Vermont, appearing as a “Category I” species on the list of Invasive Exotic Plants of Vermont.<sup>15</sup> Japanese barberry, multiflora rose, and Norway maple, while still invasive, are slightly less aggressive and are considered “Category II” species. The honeysuckle may be either Category I or II, depending on which species it is. These categories are assigned by Vermont’s Invasive Exotic Plant Committee based on the threat posed by each species to our natural environments.

Except for Norway maple, the invasive species on the property are bird-dispersed. Birds spread the seeds by eating the fruits, so the shrubs can get “planted” throughout the forest. Although these shrubs grow best in the sunny openings at forest edges and along trails, most are able to grow even in the shade of the forest. If they reach high densities, they may out-compete the native trees and shrubs, altering the composition of the forest.

Currently common buckthorn is the most abundant of these invasive species on the property. While the other species occur as individuals scattered around the property, buckthorn is found in denser clumps. The largest clump observed in 2002 was found along the boundary with the Episcopal Diocese.

### Overuse of sensitive areas

In general, the main trail that runs through the property is well suited to accommodate substantial pedestrian and bike traffic without negative impacts to the ecosystem. However, negative impacts will result from trail users straying off the main trail. As discussed in the ‘natural communities’ section, the outcrop areas are prone to disturbance because the soils are shallow and easily eroded. Also, many of the rare plants can be easily destroyed by foot or bike traffic. Ground-nesting birds and other wildlife, especially during periods of raising young, are easily disturbed by people or pets wandering off the existing trails. It is very important to close the recently-created informal trails, and to prevent the establishment of new trails, especially on outcrop areas or in the vicinity of any of the wetland areas.

### **Dumping and other issues of property encroachment**

Scrap lumber, lawn clippings, tree branches, and leaves have been dumped along the unmarked property boundary behind the North Avenue homes and behind the Elks Club. Piles of these materials detract from the natural aesthetics of the property, and they can also negatively impact the ecosystem. The piles prevent the growth of tree seedlings and other plants that grow on the forest floor. These materials may also contain chemicals (i.e. herbicides, fertilizers) that can wash into the vernal pools and seasonal streams that are found adjacent to the areas where the dumping has occurred.

Some areas behind the North Avenue houses are maintained as mowed lawns. This use prevents the growth of natural forest vegetation. In one case, trees have been cleared recently in an area that is considered a wetland based on the soil characteristics. This action is a violation of the Vermont Wetland Rules. Although the forest edge in these areas is not 'pristine' (i.e. there are many invasive species and the trees are not especially large or old), it is nevertheless important to prevent encroachment into the forest. Not only will this forest edge eventually develop into mature forest, but every bit of encroachment on the existing forest slowly reduces the overall size of the forest and allows invasive species to move further into the forest.

#### **Pertinent Natural Resource Laws**

Vermont Endangered Species Law (10 V.S.A. Chap. 123) protects plants and animals listed as Threatened or Endangered in Vermont. At the Arms Grant property there is one species protected by this law: harsh sunflower (*Helianthus strumosus*).

The Vermont Wetland Rules protect significant wetlands in the state. According to the Vermont Significant Wetland Inventory Map, there is a protected wetland along the property boundary that is closest to North Avenue. Field visits in the late summer of 2002 indicated that these boundaries may not be accurate today. However, there are wetland areas in the vicinity. The wetlands do meet some of the functional criteria for evaluating a wetland's significance: they are used for educational purposes (by the school at the North Avenue Alliance Church) and they provide wildlife habitat (wood frogs and spotted salamanders use the vernal pools for reproduction). By these criteria, these wetlands should be protected by the Vermont Wetland Rules from any draining, dredging, filling, grading, or alteration of the water flow. At the Federal level, Section 404 of the Clean Water Act also regulates the dredging or filling of wetlands.

## MANAGEMENT

The management policies and tasks described below are designed to abate the stresses and threats listed above, and to achieve the conservation vision. This section begins with a general discussion of the management, followed by proposed policies and specific management tasks.

### General Management Discussion

The property should be managed to protect the conservation targets from the stresses listed in the previous section, and to maintain most current uses of the property. Management activities should also strive to maintain the natural state of the entire forest ecosystem. While the trail system can sustain an increase in use with minor improvements, it would be detrimental to the forest ecosystem to undertake any substantial development (such as any sort of building or roads) on the property. Key components of the management of this property include:

1. Prevent the creation of new trails through the property and close existing unauthorized trails.
2. Eliminate dumping and encroachment on the property.
3. Control the spread of invasive plant species.

### Proposed Policies

- Allowed uses include passive recreation such as hiking, biking, walking, running, skiing, snowshoeing, and nature observation on the existing trails. Bikes are allowed, but only on the main trail. The main trail is suitable for bike use; however, the side trails are too narrow and too prone to erosion.
- Dogs are allowed on the property, but should be kept on the trails and on a leash. Dog waste should be removed. Dogs running freely through the woods can disturb the wildlife and plants, especially ground-nesting birds (see Appendix V for a list of potential species) and wildlife in vernal pools. Since this property is a natural area, protection of wildlife and plant life must be given a high priority. Dogs off leash can also lead to conflicts with other users. As a public area, it is important that all users can feel comfortable using the property. This leash policy is a compromise that should minimize negative impacts on wildlife and still allow dog-walking on the property.
- No motorized vehicles allowed.
- No creation of new trails or widening of existing trails. Several factors support this recommendation. In order to keep the area in a natural, sustainable state, it is important to prevent the spread of invasive species into the property. Trails, especially those wide enough to allow full sun to the forest floor, can act as a corridor along which invasive plant species can spread. A dense network of trails also fragments the forest habitat into smaller pieces, making it less suitable for the many species of wildlife that are sensitive to human disturbance.
- No collecting of plants without permission from Parks and Recreation. Permission should be granted only for legitimate educational or research purposes (i.e. not for

commercial collecting). Collectors should not collect underground parts of the plants or any rare plant species. Provide those who receive permission with a list of the known rare species on the property.

- No dumping of trash or lawn waste on the property. No mowing, clearing, or storing equipment on the property.
- No cutting of trees (except hazard trees). Refraining from active forest management may eventually result in different tree species dominating the forest and may lead to more diseased or dead trees than might be found in a forest managed for timber production. However, as an Urban Wild, the purpose of this property is to serve as a natural area where natural processes are allowed to proceed without interference. For this reason, tree cutting is not a recommended use for this property. Exceptions include removal of trees that present imminent threats to trail users (i.e. a blow down that is dangling over the trail or a dead tree adjacent to the trail that is about to topple over), and removal of invasive shrub species.
- No camping or campfires. Frequent camping anywhere on the property creates the problem of disposal of human waste. Campfires pose the danger of spreading, especially during dry periods.

### Specific Management Tasks

The recommended management tasks are presented briefly in the following table and discussed in greater detail in the text following. The tasks are organized into categories based on general topics such as trails, boundaries, etc.

Table 2. Recommended management tasks for the Arms Grant property. The asterisks (\*\_\*) indicate high priority tasks. More details are provided in the following text.

TASK	DESCRIPTION	TIMELINE	PARTICIPANTS
<b>Trails</b>			
*Discontinue unauthorized trails*	Brush in unwanted trails (see Figure 7) and post informative signs.	Start in early spring	Parks and Rec & Volunteers
Maintenance/improvements	Eliminate worst muddy spots and install trail signs.	Spring months (to be able to locate wettest spots)	Parks and Rec
Access points	Explore option of allowing access to existing trails at North Avenue Alliance Church.	Anytime	Parks and Rec
Trail monitoring	Watch for new trails (brush them in), remove fallen trees, and monitor dog walking use.	Monthly during spring/summer/fall	Volunteers: BHS?
Explore loop trail options	Discuss use of Diocese trails for a hiking loop trail	Anytime	Parks and Rec
Monitor and control impacts of dog use	Monitor compliance of dog owners with leash rules; use signs to encourage compliance.	Anytime	Volunteers/Parks & Rec
Continued on p. 19			

<b>Invasive species control</b>			
*Remove Buckthorn*	Cut down plants or girdle plants	2x/summer or winter	Volunteers: Rock Point School
Monitor Honeysuckle, Barberry, Norway maple & Multiflora rose	Monitor abundance of these species before starting physical control	Annually	Volunteers
<b>Increase public awareness &amp; appreciation</b>			
*Signs*	Install trail & boundary signs	Anytime	Parks & Rec
Brochure	Prepare a brochure with map, property description & policies	Anytime	Parks & Rec / Volunteers
Promote volunteer opportunities	Recruit trail monitors, trash clean-up crews, invasive species removal crews, and wildlife trackers	Year-round	Parks & Rec
<b>Boundary-related issues</b>			
*Encroachment*	Mark boundaries and notify adjacent homeowners of encroachment issue	As soon as possible	Parks & Rec.
Boundary with high school	Consider adjusting this boundary line to include the outcrop forest within the Urban Wild	Anytime	Parks & Rec & Burlington High School
Mark all boundaries	Clearly mark all boundaries to indicate the property is owned by the City and it is an Urban Wild	Easiest during the Winter	Parks & Rec and/or professional surveyor
Acquire adjacent forest land	Pursue the option of acquiring the adjacent forest and wetlands on the Elks Club property	Anytime	Parks & Rec in collaboration with Elks Club
<b>General property management</b>			
Trash cleanup	Remove trash from the property	Spring/Summer/Fall	Volunteers: North Avenue Christian School, Rock Point School
<b>Biological information gathering</b>			
Organize biological information	Develop a central location for all information about rare and invasive species on the property	Anytime	Parks & Rec
Monitor harsh sunflower	Annually monitor the population of harsh sunflower	Late August	Trained volunteer
Identify <i>Eupatorium</i> species.	Confirm identification of the <i>Eupatorium</i> species.	Late summer	Volunteer botanist or VT Nongame & Natural Heritage Program Staff
Expand property species list	Encourage naturalists to submit their findings on the property	Anytime	Volunteers

## Trails

- Discontinue unauthorized trails: Figure 7 shows side trails which should be closed. These trails pass over outcrop areas that are especially prone to erosion and provide habitat to rare plants. This may be the most difficult management objective to achieve.

Discontinuing trail use will certainly be a challenge, since these trails appear to be heavily used, judging by the condition of the trails. Brushing in these trails may help to discourage bikes; however, this method will probably be most effective if combined with education. The more trail users know about the importance of staying on the established trails, the more likely they will be to comply with this rule. Posting signs with color photos of some of the rare plants that are destroyed by new trails is one method of education. A key partner in the effort to prevent mountain bikers from going off of the main trail is the Burlington High School. The school uses the main trail for mountain bike classes and includes the issue of staying on marked trails as part of their course. Their courses should stress that creation of new, unauthorized trails is irresponsible and jeopardizes the continued access of mountain bikes to existing trails. Another potential partner is the Elks Club. As the property owner of adjacent land that also has many newly created mountain bike trails that link to those on the Arms Grant property, they may be willing to allow their trails to be brushed in as well.

- Maintenance/improvement: The priority areas for improvement along the trails are at two spots that were muddy even during the very dry late summer of 2002 (see Figure 7). It is important to improve these areas because trail users tend to try to go around muddy sections. The undesirable result is the ever-increasing width of the trail at that location or the establishment of new trails that bypass the muddy area. In order to avoid this outcome, placing Ecotrack® (see [www.biketrack.com](http://www.biketrack.com)) or a similar product in the muddy areas would be a low-cost, low-impact, and low-maintenance solution.

The trails should not be widened, especially in the areas where the rare plants are found close to the trail. It appears that the High School does some maintenance to keep vegetation from encroaching on the trail. The person doing the trimming should be made be aware of the location of the rare harsh sunflower plants.

- Signs: Install a sign that makes it clear to bike riders that bikes are only allowed on the main trail, and make it clear which trail is the main trail. Small trail markers with a picture of a hiker and biker together are available and may suit this purpose. Be sensitive to the issue of putting up too many signs which can detract from the sense that the property is a natural area.
- Access points: All existing access points require the users to pass across other properties to reach the Arms Grant property. Burlington High School is the only access point where there is public parking, although this is not a practical option during school hours. Access to the existing trails from behind the North Avenue Alliance Church requires users to park their cars in the church parking lot. Contact the Church to discuss the possibility of allowing public access from this site.



Improving and promoting access to the trails from the Burlington Bike Path is *not* recommended. Currently this unmarked and sandy access point is not appealing to most cyclists. Given the tremendous use of the bike path, marking and improving this access point could lead to an unmanageable level of use of the Arms Grant trails. If overuse by bikes becomes a problem, a pedestrian style may be needed at this point.

- **Monitoring use & condition:** Conduct monthly inspections of the trail to check for and remove hazardous trees. Ensure that any newly formed trails are quickly blocked off. Pile brush in front of any new trail to make it clear that it is not an official trail. If the trail appears exceptionally muddy (i.e. during early spring), install temporary signs at the trail entrance that discourage bikers from using the trail until the soil is drier.
- **Explore loop trail options:** If users of the property request a loop trail option, explore the following options. One option is the loop created by walking from the High School along the main trail out to the bike path, then turn left (south) along the bike path back to North Beach and up to the High School – this is approximately a 1.7 mile loop. However, do not promote this option with signs that would draw users from the Burlington Bike Path since this would lead to excessive levels of bike use of the Arms Grant trails. Another option is to work with the Episcopal Diocese which might be willing to allow *pedestrians only* to loop from the end of the main trail on the Arms Grant property, back through their fields and up to the starting point of the main trail. Creating a new trail through the Arms Grant forest is not recommended (see Proposed Policies).
- **Monitor and control impacts of dog use:** Monitor level of use by dog walkers. If dog walkers are not keeping dogs on a leash and are not cleaning up after their dogs, action should be taken to encourage compliance. One method is to use signs to educate users about the importance of these rules and to warn that failure to follow these guidelines could lead to the loss of the opportunity to walk dogs on the property.

### **Invasive species control**

Control of invasive species requires persistence and a sustained effort over several years. Detailed records should be kept to document the extent of the invasive species and control methods used. This record-keeping allows for adjusting management depending upon the effectiveness of the control methods. Since invasive species control is a time-consuming process, it is necessary to prioritize which species pose the greatest threat to the conservation targets of the area. Based on the threat it poses to the forest ecosystem, common buckthorn is the priority species for control on the Arms Grant property.

With practice, identification of the invasive species on this property is fairly straightforward and the fact sheets in Appendix III will help with identification. However, large groups of untrained volunteers should not work unsupervised and risk damaging the native shrub species. Have one or two people who are confident with

their identification skills flag or paint the invasive shrubs so that the rest of the group can just remove the marked shrubs.

- Buckthorn can be controlled by girdling the shrubs near the base with a 2-3cm wide cut through the bark. Another approach is to cut the shrubs down twice per year (in early June and late August) for a few years in a row. A third recommendation that may work for smaller plants is to pull up the plant with a 'weed wrench', which will remove the roots as well. However, this approach has had unsatisfactory results in some cases.<sup>16</sup> Initially the greatest control efforts should be given to the area along the boundary with the Diocese property at the point where the Diocese fields are the closest to the boundary line. This area has the highest concentration of these shrubs on the property. Although herbicides are a recommended control method in some situations, their use is not recommended on this property since it is a natural area with sensitive wetlands (see Figure 7).
- Japanese barberry, multiflora rose, Norway maple, and honeysuckle can also be controlled by cutting. However, there were no concentrated areas of these species found on the property in 2002-2003, so these species should be monitored before starting control methods. On an annual basis, a volunteer should search for the invasive plants and note whether the plants of each species are increasing or decreasing in number. If the numbers appear to be decreasing or staying at low numbers naturally, then it may not be necessary to expend time and effort to physically remove them.

#### **Increase public awareness & appreciation of the property**

- Signs/maps: Signs should be installed to promote the use and appreciation of the property. A welcome sign should be located at the main entrance point from behind the Burlington High School (see Figure 7). This sign should include a list of use guidelines, a simple map or description of the trails, and a box used to distribute interpretive materials such as a brochure, or announcements about volunteer opportunities on the property. Along the property boundaries small signs should be tacked to trees that indicate that the land is a natural area owned by the City. Be sensitive to the issue of putting up too many signs which can detract from the sense that the property is a natural area.
- Brochure/trail guide: Create an interpretive brochure that trail users could use to learn about the property as they walk along the trail. In addition, include this type of information on a permanent sign.
- Volunteer opportunities: Providing residents with productive opportunities to help steward the property is an excellent way to increase local support of Burlington's Urban Wilds. Volunteer opportunities can include individuals working on their own or large groups gathered for a whole day of work. Suggested volunteer roles:
  - Trail monitors. One or two people who walk the trails on a regular basis who could report any hazardous trail conditions (i.e. dangerous trees overhead or large limbs in the trail) and development of new, unauthorized trails.
  - Trash clean-up crews.

- Invasive species removal crews.
- Winter wildlife tracking.
- Rare species monitor. Trained volunteer(s) who could annually monitor the populations of the harsh sunflower and other rare plants.

### **Boundary-related issues**

- Encroachment:
  1. Clearly and permanently mark the eastern boundary.
  2. Notify the homeowners along North Avenue who are storing items, dumping yard waste, cutting trees, or maintaining a lawn on the Arms Grant property that they are encroaching on City property. Request that they stop these activities and monitor this area to ensure compliance.
  3. To avoid encroachment problems with future homeowners, post small signs along this boundary that indicate that the property is a city-owned Urban Wild. An example of such a sign is included in Appendix VII. A low wooden fence along this boundary could also provide a clear natural area boundary.
- Boundary with Burlington High School: Consider adjusting the property boundary that separates the High School property from the Parks and Recreation property. Figure 7 shows a proposed adjustment that would follow a more ‘ecologically-based’ boundary. This adjustment would allow one of the largest outcrop areas, including some documented rare plants, to be included within the Urban Wild.
- All boundaries should be marked to indicate the property line of the city-owned Urban Wild (see sample in Appendix VII). The entire property line should be surveyed by a professional surveyor.
- Acquire adjacent forest land to the northwest: Pursue the option of acquiring the adjacent forest and wetlands on the Elks Club property. The forested outcrops and wetlands that are located on the adjacent Elks Club property are ecologically connected to the Arms Grant property. Not only does this adjacent property have great conservation value because of the presence of several rare plants species on the outcrop areas, but its addition to the Arms Grant forest would ensure that this forest land remains available as wildlife habitat to species that use the Arms Grant/Rock Point forest.

### **General property management**

- Trash cleanup: Several piles of trash are scattered through the forest – mostly the remains of squatters’ camps. None of the trash is visible from the trails, but there are substantial amounts. The first priority is to remove the trash and other items that are adjacent to the vernal pool behind the houses on North Avenue. Ideally, this material should be cleaned up by the homeowners once they are notified about the encroachment issue. However, this would also be a good opportunity for volunteers to assist with the work. Christine Holzschuh of the North Avenue Christian School said that her class could help out with that work. Other groups that may have volunteers available include: IBM volunteer group, UVM community service group,

First Unitarian Universalist Society, Boys and Girls Club, VISTA-AmeriCorps. Chuck Courcy, property manager of the Episcopal Diocese property, also has a student group who could participate in this type of project. Money from the Chittenden Solid Waste District's Community Cleanup Fund can help to pay for the cost of disposing the trash.

### Biological Information collection & organization

- Develop a system for maintaining information about the uncommon plants and animals that are documented from the property, as well as the abundance of invasive species. This could be as simple as maintaining a file folder where all reports of birds or plants or turtles would be kept. This could prove to be a valuable resource in the future if new management issues surface. It would also be helpful in evaluating the effectiveness of management activities.
- Annually monitor the population of harsh sunflower. In September count the number of flowering stems along the trail. Depending upon the time available, the person doing this task could also search off-trail for new locations of this wildflower and the other rare plants documented from the site.
- Confirm identification of the *Eupatorium* species. An experienced botanist should search in September for this plant and other specimens to determine which species is found on the property. The results of this work and the annual monitoring should be reported to the Vermont Nongame and Natural Heritage Program.
- Encourage naturalists to submit list (but not actual specimens) of all species that they find on the property.



Poke Milkweed

*Asclepius exaltata*

## REFERENCES

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- <sup>1</sup> City of Burlington. 04 February 2002. Resolution Relating to: Conservation Legacy Program.
- <sup>2</sup> City of Burlington. 2002.
- <sup>3</sup> Meals, Don, and Wayne Gross. 30 January 2002. Burlington Conservation Board Memorandum: City Council Resolution – Conservation Legacy Program.
- <sup>4</sup> Chittenden County Community Planning Tool website, Accessed 12/20/02, <http://crs.uvm.edu/rpcs/chittenden/>
- <sup>5</sup> Gilroy, T., M. Hattler, D. Quick, and A. Ruesink. 1996. Rock Point: Natural Features, Land Use and Management Options. Prepared for the Rock Point Property Task Force and the Burlington Conservation Board.
- <sup>6</sup> “Thirteen farms lie within city limits here”. Burlington Free Press. 11 November 1955,
- <sup>7</sup> Doll, C. (ed.) 1961. Centennial geologic map of Vermont. Vermont Geological Survey, Montpelier, VT.
- <sup>8</sup> Doll, C. (ed.) 1970. Surficial geologic map of Vermont. Vermont Geological Survey, Montpelier, VT.
- <sup>9</sup> NOAA-CIRES Climate Diagnostics Center website, Accessed 8 November 2002, <http://www.cdc.noaa.gov>.
- <sup>10</sup> Meyers, J., F. Smith, and P. Hansen. 1993. Identifying sustainable forest community natural areas in Burlington.
- <sup>11</sup> Thompson, E. and E. Sorenson. 2000. Wetland, Woodland, Wildland: A guide to the natural communities of Vermont. University Press of New England, Hanover, NH.
- <sup>12</sup> Thomson, Elizabeth. 2003. Personal Communication.
- <sup>13</sup> Gilroy, T. et. al. 1996.
- <sup>14</sup> Vermont Invasive Exotic Plant Fact Sheet Series. Spring 1998. Produced by the VT Departments of Environmental Conservation and Fish and Wildlife, and The Nature Conservancy of Vermont.
- <sup>15</sup> Vermont Invasive Exotic Plant Fact Sheet Series. 1998.
- <sup>16</sup> Clark, F. H. 1998. Lifestyles of Invasion: Common & Glossy Buckthorn. New England Wild Flower, Vol 2, No. 3.