



**Recommendations for Field Management  
at Rock Meadow**

Submitted

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to the

**Town of Belmont  
Conservation Commission**

by

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## **Introduction**

Early successional natural communities – grasslands, meadows, and shrublands – are an increasingly uncommon cover type in our region. In the natural process of succession, grasslands and meadows are pioneered by woody species, becoming shrublands; as tree species seed into the site and grow taller, shrublands succeed to forest. In order to maintain early successional habitat, some disturbance is required to continually set back the clock of succession.

Natural disturbances that create early successional habitat include browsing, fire, wind damage, forest disease, and beaver damming. Some of these processes occur on our landscape, but some, such as large scale browsing by wild animals, and fire, have essentially been removed from our landscape. In addition, throughout Southern New England agricultural landscapes are being abandoned and allowed to revert to forest or developed for housing or commercial use. As a result, the Massachusetts landscape, which was as little as 20% forest at the height of land clearing in the 1850s is now nearly 80% forested. While forest makes fine habitat, a wide range of plants and animals require grasslands or shrublands for parts of their life cycles. With fewer natural processes allowed to set back the successional clock, humans must take an active role in managing for early successional cover.

The Rock Meadow Open Space, roughly 71 acres in total area (Figure 1), includes 33 acres of forest, 13 acres of grassland habitat, 5 acres of wet meadow and shallow marsh, 4 acres of weedy trees, and 14 acres of early successional shrubland habitat. An additional 2 acres are occupied by community garden plots.

The fields have been kept open by regular mowing in the past, but mowing became sporadic in the mid-1990s. The Conservation Commission and other interested parties recognized that the open field sections of the property were beginning to revert to shrubland along the edges and are interested in resumption of mowing. Currently, the largest contiguous grassland units are the 4.1 acre heart of the North Meadow and a 3.9 acre section of the West Meadow. Removal of the expanding shrubs will create three large meadows of 7, 8, and 13 contiguous acres. This report provides specific recommendations for restoring and maintaining the open fields.

This project and report follow, and share many details of approach and content with, a similar analysis Ecological Extension Service recently conducted on the McLean Hospital Open Space, also in Belmont. Land managers at both sites are interested in maintenance of early successional cover for wildlife habitat, passive recreation, and scenic values. While the two reports share some explanatory material, the management recommendations below are entirely specific to Rock Meadow.

## **Methods**

Mass Audubon staff visited the site on 8 August and 26 September 2006. The site inspection included a walking inventory of the open meadows and shrubby areas with brief exploration of the forested and woodland sections. Areas or stands with a common management need were delineated on an aerial photograph, and these units were then

reproduced in ArcView GIS software. ArcView was used to calculate acreage for each management unit. The recommendations below were generated based on our experience managing early successional habitat, the characteristics of the vegetation encountered, and our experience planning for and implementing invasive species control.

## **Inventory Results and Management Recommendations**

Comments focus on maintenance of open habitat and control of invasives. Recommendations include removal of native species, such as staghorn sumac where it is growing into the meadow, and medium-sized trees (primarily black cherry) where individuals have established in the meadow or on the edge. For purposes of clarity, I propose the following names for each management area (Figure 2):

- East Meadow – the meadow directly north of the parking area, adjacent to Mill Street and north of the community gardens.
- West Meadow – the meadow west of the community gardens, beyond a line of trees.
- North Meadow – the meadow running adjacent to Concord Avenue.
- Wet Meadow – the wet meadow/shallow marsh between East Meadow and North Meadow.

Comments are keyed to management units numbered in Figure 3.

### **East Meadow**

This 8.2 acre section is a combination of grassy meadow, staghorn sumac thicket, and buckthorn-dominated shrub stands. A stand of Tree-of-Heaven, adjacent to the community gardens, and a small patch of black swallowwort are the most pressing management issues in this field.

Grassy meadow (15) – The 2.6 acres currently dominated by grasses require little other than regular mowing to maintain as high quality grassland. Grasses dominate with milkweed, goldenrods, asters, and other wildflowers at low density.

- *Mow annually after August 1<sup>st</sup>. After shrubby invasives are under control in adjacent sections, could reduce mowing to every second year. Longer mowing period would tend to favor non-grasses, but meadow should be monitored for reinvasion by woody species.*

Sumac stands (9/11/19) – Three sections totaling 2.3 acres dominated by staghorn sumac with some smooth sumac. The woody sumac stems are quite dense in places, and grow to 15 feet, although the average height is closer to 6 feet. The sumacs grow in nearly pure stands, with very few other woody species, yet grasses continue to thrive underneath. As a result, the grassland would be expected to restore itself well after the sumacs are cleared with heavy equipment.

- *Clear with heavy equipment, then mow annually on same schedule as grassy meadow.*

Buckthorn stands (10/12/14/18/20/28) – Several small shrub copses totaling 1.5 acres, dominated in combination by glossy buckthorn and common buckthorn, dot the field. These two invasive shrub species also dominate roughly one acre of field edge, along the margins between the grassland and the forest, gardens, and roadside.

- *Clear with heavy equipment, monitor for resprouting. Plan for application of herbicide if resprouting is particularly aggressive.*

Tree-of-Heaven (4, 16) – A half-acre stand of almost pure tree-of-heaven stands just northeast of the community gardens and a smaller stand of tree-of-heaven at the very southeast corner of the property, where the entry driveway meets Mill Street. This is one of the top three invasives management issues at the entire property. Tree-of-Heaven is an aggressive invader of fields and, if not cleared from these locations, will be a lasting management headache in the fields. The shrub layer in the larger stand is dominated by common buckthorn with tree-of-heaven seedlings also prevalent. One difficulty of clearing this area is the remnant of a concrete foundation standing in the middle of this patch. Clearing work will require heavy machinery, chainsaw work, and herbicide.

- *Clear with chainsaw, paint stumps with herbicide. Ideal treatment for Unit 16 would include extra budget for removing foundation and other construction debris, regrading, and reseeding this area with little bluestem, or expanding community gardens into this area.*

Black cherry stand (25) – A stand (0.17 acre) of medium-sized trees with four black cherries and several black oak over a thick shrub layer of common buckthorn, glossy buckthorn, and staghorn sumac. Poison ivy and garlic mustard are thick on the ground; oriental bittersweet is climbing into some of the trees. There is an impressively large common buckthorn growing here, disguising itself as a gnarled old apple tree.

- *There would be some value in retaining the larger native trees here, especially if the adjacent Tree-of-heaven stand is cleared out and the gardens expanded in this direction. If the shrubs remain underneath, however, they will simply serve as seed source and sanctuary for the invasive species we are attempting to remove from the meadow. This entire area could be cleared and integrated back into the meadow with frequent mowing and some grass seeding. Alternatively, a contractor might be able to clear out much of the invasive shrubby material with proper equipment and leave most of the trees. This will most likely lead to re-sprouting which could be controlled with herbicide.*

White pines (17) – a small stand (0.04 acre) of 5-8 white pines with several black cherry amidst, directly adjacent to the tree-of-heaven stand.

- *This stand could remain, as shade and windbreak for the community gardens, or it could be removed in the interest of rooting out the tree-of-heaven stand and maximizing garden and/or meadow space. Invasive shrubs and garlic mustard should be cleared from underneath.*

Black swallowwort (13) – This very rapidly-spreading, highly invasive vine was found at only one location in the East Field. A small patch of 10-20 plants.

- *Treat with herbicide. Monitor and plan to re-treat in following year.*

Aspens (3/6/8)– Small copses of quaking aspen totaling 0.22 acres. Could be left for habitat value and for aesthetic appeal and sound screening from Mill Street.

- *Leave stands intact. Advise mowing contractor to mow right up to current extent of aspens, so they do not slowly creep into field.*

Woodland (5/7) – Black oak and black cherry-dominated stands (0.7 acre) alongside Mill Street. This strip of open-canopy, medium-to-large trees serve as a sound and visual buffer between the meadows and Mill Street and so should not be cleared. They are, however, dominated by common and glossy buckthorn in the shrub layer, and these dense stands will act as a seed source for re-colonization of the meadows.

- *These stands might be cleared out underneath the large trees, or, like the aspen stands, monitored so that the shrubs do not slowly creep back into the field.*

### **North Meadow**

This 7.6 acre section includes grassy meadow, sumac, and glossy buckthorn-dominated thickets along the edge. The most serious threat is from a large and expanding patch of black swallowwort in the middle of the grassy meadow.

Open meadow (34) – Grass-wildflower meadow (4.2 acres) with dominants ranging from grasses to goldenrods over most of open area with more wetland-associated plants, such as Joe-pye weed in the very north. Significant invasion of black swallowwort (mapped separately).

- *Mow annually after August 1<sup>st</sup> with regular monitoring for spread of black swallowwort.*

Sumac (33, 36, 43,46) – Large stands of staghorn sumac (1.9 acres) expanding into meadow. Largest, oldest individuals to 15' with most under 10'. Growing in nearly pure stands with grasses underneath.

- *Clear with heavy equipment. Southeast unit (33), which includes other shrub species, may be partially or completely retained to buffer wetland.*

Black locust (35) – A large stand of tall, mature trees (0.72 acre). Do not seem to be spreading into meadow.

- *Adjacent area should be monitored to restrict spread of seedlings into meadow.*

Buckthorn thicket (48) – Buckthorn-dominated shrub stand (0.58 acre) also including pin cherry with oriental bittersweet and Virginia creeper thick in places.

- *Clear to reconnect with meadow. Monitor for resprouting.*

Dogwood (47) – Small, dense stand of gray dogwood (0.04 acre).

- *Could be retained for food and cover value, but may make future mowing more difficult.*

Trees (41) – Stand of black cherry with buckthorns and other shrubs underneath and oriental bittersweet in the branches (0.16 acre).

- *Leave trees as buffer to wet meadow, but shrubs along edge could be cut back, and oriental bittersweet vines should be cut at base.*

Aspens (45) – attractive stand at north end of meadow (0.35 acre).

- *Leave for habitat, but continue to mow adjacent grassland to limit spread of aspens into field.*

Black swallowwort (39, 42) – These two locations of this nasty invasive are the number one management concern on the property (0.16 acre). Black swallowwort's ability to expand rapidly, to establish new infestations via its wind-dispersed seeds, and its habit of growing in a mat with other vegetation make it hard to eliminate.

- *Contractor should develop specific plan to treat these and other locations (in West Field) with herbicide, including on-going monitoring and repeat treatment.*

Tree-of-heaven (37, 38, 40) – Small stands (0.19 acre) of this invasive tree with a ranging from a single tree (37) to ~10 trees (40) growing to 10-15 feet over many saplings.

- *Should be removed, treated with herbicide, and monitored for resprouting.*

### **West Meadow**

A 13.5 acre area of mixed grasslands and buckthorn-dominated thickets with scattered trees.

Meadow (54, 64, 67) – Attractive grassy meadow (6.2 acres), somewhat more diverse in its grass and wildflower mix than the North and East Fields.

- *Should be mown annually to maintain as grassland.*

Aspens (52) – A small stand of aspens on the meadow edge (0.22 acre).

- *Should be left intact.*

Buckthorn thicket (53, 55, 57, 62, 65, 66, 68, 69, 70, 73) – Dense stands of shrubs dominated by glossy and common buckthorn (5.9 acres).

- *These thickets should be cleared, monitored for resprouting, and possibly treated with herbicide to hasten restoration to grassland.*

Black Swallowwort (58, 59, 60, 61) – Presence of black swallowwort (0.05 acre) ranges from single stems climbing into shrubby edge (59, 61) to small mats growing among bull thistle in otherwise open meadow (58) and a heavier infestation on a shrubby edge (60).

- *Black swallowwort should be treated with herbicide. Areas that will also be cleared of brush should be flagged and monitored for resprouting of black swallowwort with follow-up treatment.*

Sumac (56, 63) – Nearly pure stands of staghorn sumac over grasses (0.52 acre).

- *Larger stand (63) should be reduced in size by cutting back. Stand 56 could be left intact and some sumac could be left in 63 for food and shelter. Continuing mowing of the grassland should keep future spread of sumac in check.*

Lawn (74) – A swing set on a small patch of lawn-type grass, apparently mown by neighbors as a small play yard (0.18 acre).

- *An attractive addition to the property, no management needs.*

Trees (71, 72) – These stands (0.23 acre) include 6-10 black cherries and black oaks to 8” dbh. As with other trees in the meadows, they provide an attractive addition to the open meadow, however they act as refugia for most of the invasive shrub species.

- *These trees could all be removed in the interest of maximizing the extent of open meadow, or a subset could be left standing to add structural and aesthetic diversity. For any trees that are left, all shrubs should be cleared out from underneath and each tree should be carefully monitored for regrowth of invasive shrubs and vines.*

### **Wet Meadow**

This section of treeless vegetation (4.2 acres) lies roughly at the center of the property, abutting each of the three other meadows. Vegetation ranges from cattail stands associated with the deepest water to joe-pye weed and goldenrod-dominated grassy wet meadow on the slightly higher, drier ground. Purple loosestrife is common throughout. A few small willows grow amidst the cattails. This patch provides habitat diversity for birds, amphibians, and invertebrates in addition to visual appeal from many perspectives.

- *There appears to be no need to mow into even the less inundated sections of this wet meadow as troublesome woody plants appear not to be present in any numbers. Ongoing monitoring should watch for increases in purple loosestrife and possibly plan control efforts focused on reducing the population.*

## **Specific Management Steps and Timeline**

### **Shrub clearing**

The areas listed below (12.8 acres total) should be cleared with a brush mower capable of handling vegetation up to 4 inches in diameter. The woody debris resulting from clearing should be removed from the areas of heavy shrub growth to promote reversion to grasses. Areas should be monitored for aggressive resprouting of invasives and possibly treated with herbicide to reduce woody resprouts and favor grasses.

- East Meadow – sections 9,10,11,12,14,18,19,20,28 (3.8 acres).
- North Meadow – sections 33,36,43,46,47,48 (2.5 acres).
- West Meadow – 53,55,56,57,62,63,65,66,68,69,70,73 (6.5 acres).

### **Tree clearing**

Larger trees should be removed from the following sections. Stem diameters (dbh) are approximate. Chainsaws may be necessary for many of these trees. If some trees are reduced mechanically, heaviest woody debris should be removed from fields. The tree-of-heaven stumps should be painted with herbicide to reduce stump sprouting.

- East Meadow – sections 4 (~10 tree-of-heaven to 6” dbh), 16 (~50 tree-of-heaven to 10” dbh, 10 black cherry to 6” dbh), 25 (15 black cherries and black oak to 10” dbh).
- West Meadow – 71 (~12 black cherries and black oaks to 6” dbh), 72 (one black cherry, 6” dbh).

### **Invasives Management**

Invasive shrubs currently found in the meadow will be controlled by a combination of targeted herbicide application and repeated mowing over the long term. The contractor hired to implement vegetation management should propose methods for addressing areas of heaviest buckthorn invasion in particular. Regular mowing can reduce buckthorn, but in some cases of heavy invasion can result in a dense root mat that supports numerous resprouts. Mowing typically has to be intense and frequent to control large invasions.

Periodic review of the site should pay attention to the growth of woody vegetation around the edges, and mowing should be targeted to prevent shrubby species from re-colonizing the edges of the fields and re-establishing on the ground surrounding any trees left in the fields. Glossy and common buckthorn, oriental bittersweet, Autumn olive, and black locust will all be controlled over the long term by regular mowing.

Specific attention should be paid to the control of black swallowwort. Black swallowwort is best controlled with the targeted use of chemical herbicides. The vegetation management contractor hired for the work should ideally have experience managing black swallowwort.

### **Grassland Restoration**

Sections of the fields with very little grass regeneration after shrub clearing should be seeded with a native grass restoration mix. New England Wetland Plants is a potential source of native grass seeds for this restoration. Their Native Warm Season Grass mix would be a good candidate for this site.

### **Mowing**

After land clearing, all of the open meadow sections should be mown annually for five years to suppress woody stump sprouts, to hasten the breakdown of slash from the clearing operation, and to favor grasses over wind-dispersed weedy species such as ragweed. After invasive presence has been sufficiently reduced, mowing could be reduced to every second year. Mowing should be conducted after August 1<sup>st</sup>.

### **Equipment**

An operator with a brush mower could do the bulk of the clearing work recommended, although a chainsaw may be required for a few of the larger trees. Common equipment used for this type of work include rotary deck mowers and flail mowers. Deck mowers

act like the familiar lawn mower, cutting with a rotating metal blade. Lighter equipment such as a Brush Hog brand mower can handle woody vegetation up to 4 inches in diameter. The brush hog-type attachment is dragged behind a tractor with a set height up to 12 inches. A heavy duty rotary mower, such as the Davco mower, is a sturdier spinning disk attached to a tracked vehicle or articulating arm, so that it can reach up into higher vegetation. The Davco can also handle vegetation up to 4 inches in diameter.

Another type of clearing equipment is a spinning drum, or flail-type, mower, such as the Fecon mower. These toothed cutters, usually attached to an articulating arm, act more like wood-chippers and can grind larger diameter stems from the top down. The Fecon-type will also reduce vegetation to smaller wood chips instead of stringy slash resulting from most rotary mowers. A third approach to clearing is the Brush Brute, a toothed rake mounted on the front of a tractor, which is used to pull small-diameter vegetation straight out of the ground, roots and all. The Brush Brute would reduce or eliminate small stumps left from the clearing and would reduce stump sprouting. This method would tend to result in a large amount of disturbed soil which should be seeded with desirable grasses and monitored for invasion by wind dispersed weeds.

Any of these types of equipment would be effective for the clearing recommended at the Rock Meadow as long as mowing is used to reduce stump sprouting and maintain the meadows as grasslands in the years following brush clearing. Use of this machinery together with herbicide would be particularly effective in areas of dense invasion. Other than the Brush Brute, each type of equipment would involve only mild soil disturbance as the machinery moves about the site. If planned to avoid wet periods, soil disturbance should be minimal.

### **Timing**

The clearing recommended here involves conversion of shrubby areas to meadow, with the meadow conditions maintained over the long-term by frequent mowing. Mechanical clearing of shrubby areas is usually done in the late Spring, after leaf-out, when plants have translocated nutrients from their roots into new growth. At this point, energy reserves in the roots are low, so the woody plants will take longer to resprout. Herbicide treatment is often carried out in the Fall when plants are translocating nutrients to their roots; the herbicide is carried down into the roots, having greater impact on the plant. To avoid disturbance to birds already nesting in the targeted vegetation, initial clearing activities should be completed before May or after August.

Long-term maintenance of the meadows will require a tractor-mounted deck mower made for cutting high grass, not necessarily as robust as a brush hog deck mower. Long-term, mowing should take place after August 1<sup>st</sup>. Regular annual mowing will over time favor grasses and flowering herbaceous species over woody species. If mown annually, the meadow would be expected to equilibrate as a grassy meadow within 3-5 years.

## Potential Contractors

The following landscape contractors offer a range of land clearing and invasives management services. Information on equipment and rates are attached.

Contractor	Information
Chris Polatin Polatin Ecological Services PO Box 913 Montague, Massachusetts 01351 413 262 9102 413-659-0292 (fax)	PES provides land clearing and invasives management with a special focus on the needs of conservation land managers. They use a Brown deck mower for land clearing Rates: Mower & operator = \$60/hr. Licensed herbicide applicator = \$40/hr.
Jeff Taylor Vegetation Control Service, Inc. 2342 Main Street Athol , MA 01331 (978) 249-5348	VCS has completed habitat restoration projects for the MassWildlife Upland Habitat program. They use a Davco rotary mower for land clearing. Rates Land clearing = \$160/hr.
Letourneau Products Manufacturing Corp. Mark Letourneau President/Director of Operations 200 Chace Road Freetown, MA 02717 508-763-9737	Mark Letourneau completed the initial field clearing work in 2005. Land clearing = \$1,500/day
R. J. Cobb Land Clearing, Inc. 174 Maple St Bellingham, MA 02019 508-966-516	Cobb uses a Fecon mower to reduce woody material to fine woodchips Rates Land clearing = \$1,500/day

## Conclusion

Rock Meadow has long been known as a destination for grassland birding, for walking, and for enjoyment of an open view within a densely settled area. Top management needs to restore and maintain these values are to:

- 1) control black swallowwort at its known locations and be on the lookout for additional or new invasions
- 2) remove tree-of-heaven stands to prevent further spread
- 3) mow back sumac and buckthorn thickets to reclaim grasslands, monitor for resprouting and plan for herbicide application of aggressive resprouts.

Each of these steps will include an initial, intensive investment of time and money, followed up by 5-10 years of monitoring, repeat treatments, and adaptive management to favor open grassland over shrubs and other woody vegetation.



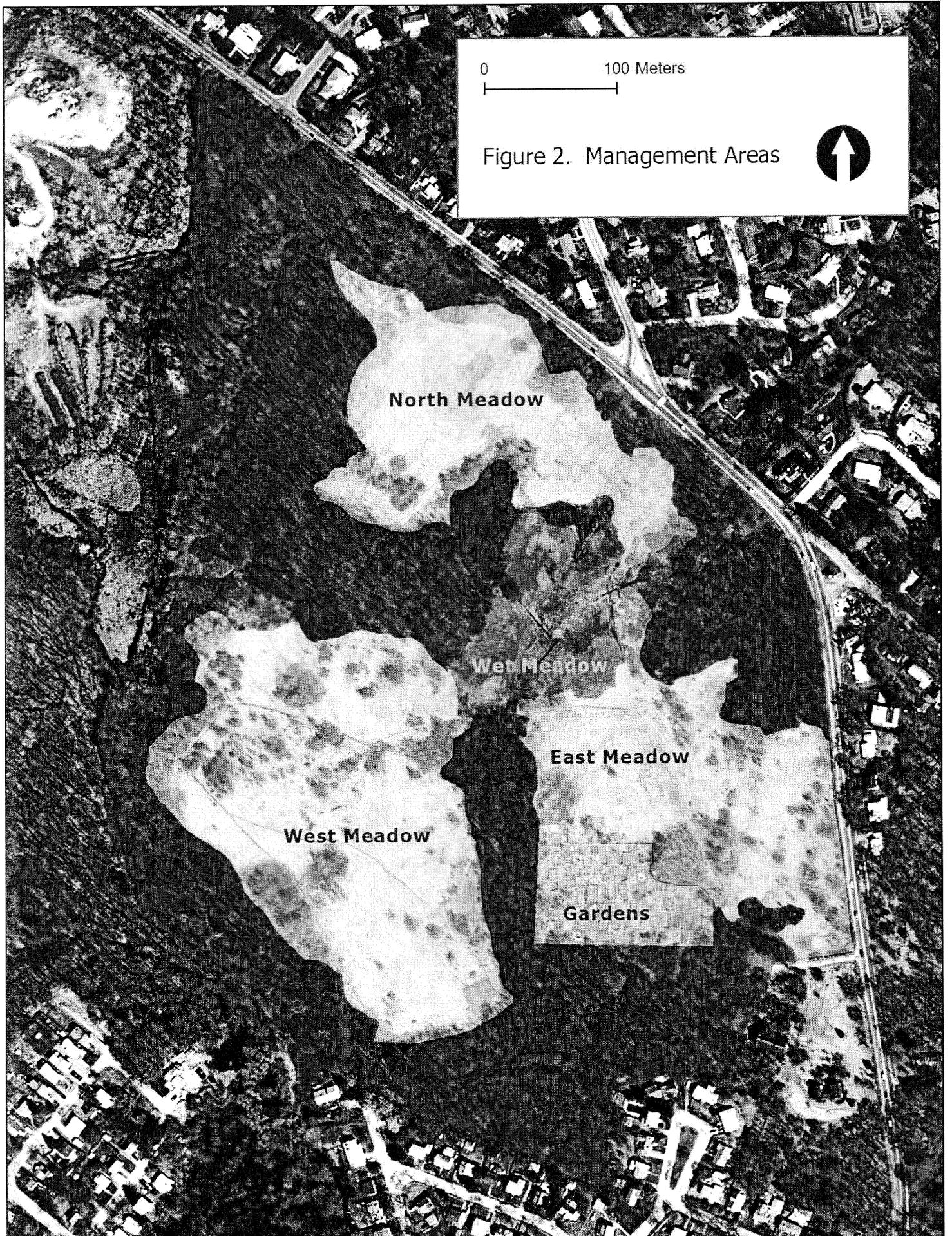
0 100 Meters



Figure 1. Rock Meadow



2005 aerial photo from MassGIS. Bounds approximate.



0 100 Meters



Figure 2. Management Areas



North Meadow

Wet Meadow

West Meadow

East Meadow

Gardens

0 100 Meters

Figure 3. Management Units 

