Mass Audubon
Protecting the Nature of Massachusetts

UPDATED Recommendations for Field Management

at

Lone Tree Hill, Belmont Conservation Land
(formerly the McLean Open Space)

Submitted

4 February 2014

to the

Land Management Committee
for Lone Tree Hill

by

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I visited Lone Tree Hill conservation land in Belmont on October 10, 2013. I walked the Heart-shaped Meadow, Great Meadow, and the Barn Meadow while accompanied by Bruce Scherer of Heritage Fields and Chris Polatin of Polatin Ecological Services (PES). Bruce has mown the fields annually since 2007 and Chris treated the fields for invasives in 2007. Bruce has commented that in the years since treatments by PES, invasive plants have rebounded at the site, both in areas that are difficult to reach with a tractor – such as around boulders, near the bases of large trees, and on steep slopes – and throughout the fields where some species persist despite regular mowing. We discussed management of the fields with an overall goal of reaching a point where the fields can be maintained in a near-optimal condition for wildlife habitat and for aesthetics with periodic mowing alone.

Because invasives have been so difficult to suppress in these meadows, and because I consider invasive plants the main threat to habitat quality in these fields, the control of invasives should be the number one management priority for the fields in the next three to five years. I observed that since my initial visits and management recommendations in 2006 (Recommendations for Field Management at the McLean Open Space, 5/15/06) regular mowing and the initial invasives control have reduced the amount of tall woody invasive shrubs in the meadows, especially where they grew in large clusters near the bases of trees in the meadows. However, invasive species have sustained themselves in some areas, returned in some places where they had been controlled, and expanded into some other areas where they were not observed in 2006. This is not to say that the initial invasives control efforts were unsuccessful or that the ongoing mowing is not effective, but instead can be attributed to the characteristics of these species that make them invasive: prodigious seed production and wide seed dispersal, aggressive root suckering and stump sprouting, and plasticity of form whereby species that typically appear as shrubs or vines are able to survive instead as low-growing ground cover when frequently mown.

The initial invasives control efforts by PES have supported maintenance of the fields as meadow habitat, improved the habitat for native birds and other wildlife, and enhanced aesthetic appeal of the meadows by offering longer views from the walking trails. While the ongoing mowing is absolutely necessary for continued maintenance of the fields, at this point it is no longer adequate to control invasives.

The initial invasives control effort, which was worthwhile to reduce the cover of invasive species, must be repeated to address areas that were not completely eliminated, to reduce cover of species that are not controlled by mowing alone, and to address new invasions.

The comments and recommendations below are keyed to the three main meadow areas, the Heart-shaped Field lying adjacent to the cemetery, the Great Meadow of Lone Tree Hill, and the Barn Meadow adjacent to the Rock Meadow parking area.

Heart-shaped Field

Regular mowing since 2007 has reduced the amount of invasive shrubs in the meadow and created a diverse community of grasses and wildflowers featuring milkweed and goldenrods. The most pressing concern in 2013 is the new infestation of black swallowwort in the meadow. This aggressive vining species was not recorded here in 2006 but is now present nearly throughout the drier section of the

field, all but the lower-lying areas farthest from the cemetery driveway. Black swallowwort and a few other invasives – including oriental bittersweet, multiflora rose, and glossy buckthorn – are able to survive the mowing by adopting a low growing habit. Mowing alone will not control their spread. Recommendations are keyed to management units shown in Map 1.

- Recommendation 1: Control the invasive plants throughout Management Unit 7, essentially the entire meadow (including the rock outcrop), in 2014 with an herbicide that targets broad-leaf species.
    - Mow the entire field in early May, 2014.
    - Apply an herbicide in June or July 2014, targeting broad-leaf specie and sparing the grasses.
    - Mow the field again in September, 2014.
- Recommendation 2: Restore wildflower diversity by over-seeding grasses with a native wildflower mix.
    - Mow the entire field in May, 2015.
    - Distribute a wildflower mix such as the Northeast Pollinator Mix for Ernst Conservation Seeds (XERC00103).

Black swallowwort is also found at high density in hard-to-mow places, such as around the rock outcrop in the northwest corner of the meadow.

- Recommendation 3: Plant shrubs around rock outcrop.
    - After application of herbicide and second mowing, plant native shrubs at high density around rock outcrop so invasives will be suppressed (September or October, 2014); species should include bayberry, sweet gale, and low bush blueberry.
    - Continue to monitor this site for black swallowwort and pull vines by hand.

Oriental bittersweet still climbs into the middle branches or canopy of several of the large trees found in Management Units 4 and 6, despite the fact that regular mowing has reduced the amount of woody invasives growing underneath the trees.

- Recommendation 4: During invasives treatments in 2014, cut oriental bittersweet vines that are growing into these trees and apply herbicide to stumps, or use other appropriate method.
- Recommendation 5: In future, supplement field mowing with hand-held brush trimmer work to remove woody invasive re-sprouts from base of these trees.

The stone wall in Management Unit 1 is still obscured by 15-20 feet of invasive shrubs including honeysuckle, multiflora rose, glossy buckthorn, common barberry, and Japanese barberry, along with native staghorn sumac and raspberry (Figures 4 and 5). Several tree-of-heaven grow halfway down the wall where two very nice old granite posts mark a break in the wall and a few tree-of-heaven grow near the north end of the wall.

- Recommendation 6: During invasives treatment in 2014, target tree-of-heaven individuals to make sure they are controlled.

- Recommendation 7: This line of invasive woody plants should be cleared out to reduce the seed source for re-invasion of the field, expand meadow habitat, and reveal the attractive and historic wall.
    - Clear the woody with a heavy mower in May 2014.
    - Apply an herbicide to the re-sprouts later in 2014.
    - Mow area again in September 2014 and continue mowing so that meadow species extend into this area.

Management Units 2 and 3 identified in 2006 have not been cleared and continue to spread into the meadow.

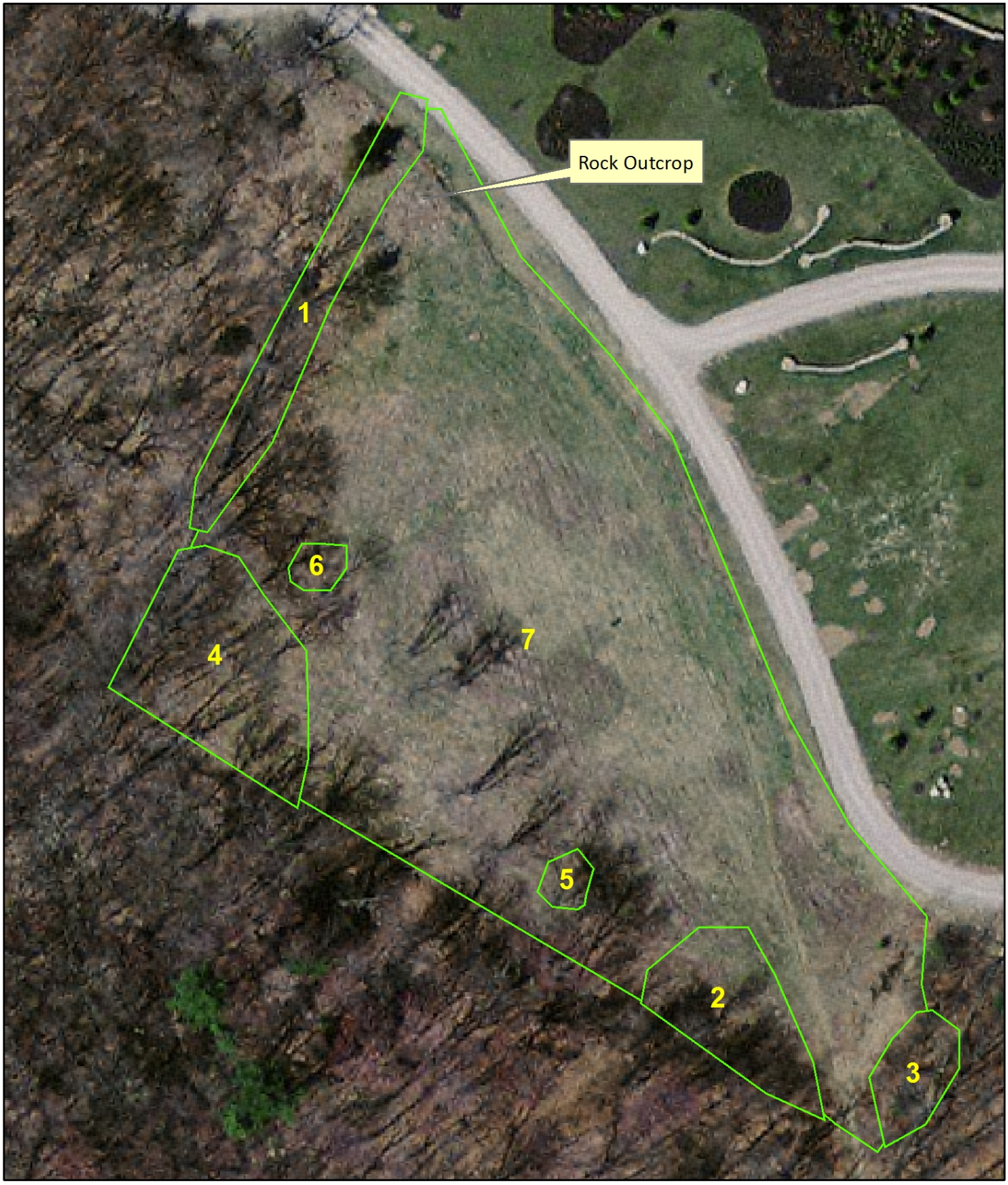
- Recommendation 8: Clear these stands and maintain as meadow.
    - Mow these stands in 2014.
    - Follow up with herbicide treatment of re-sprouting invasive shrubs.
    - Continue annual mowing in these areas to expand meadow.
    - Seed with pollinator mix as necessary (XERC00103).

Table 1. Recommended management actions for the Heart-shaped Meadow.

Recommended Action	Estimated Cost	Frequency	Experience Needed[1]	Priority
Control invasives throughout field				
Mow field in May	$1,000	Once	P	High
Apply herbicide to field	Chris?	Once	LP	
Mow field in September	$1,000	Once	P	
Suppress invasives on outcrop				High
Plant shrubs	$1,000	Once	P	
Hand pull black swallowwort	Free	Annually	V	
Remove bittersweet from trees				High
Hand cut and herbicide	$1,000	Once	LP	
Follow up clearing	Free	Annually	P or V	
Control tree-of-heaven				High
Treat trees with herbicide	$1,000	Once	LP	
Monitor and cut stems	Free	Annually	P or V	
Seed with wildflowers	$1,000	Once	P	Medium
Remove invasives from stone wall				
Clear shrubs along wall	$500	Once	P	Low
Apply herbicide to resprouts	$1,000	Once	LP	
Continue to mow annually	$0[2]	Annually	P	
Expand meadow to southeast				
Mow shrubby areas	$1,000	Once	P	Low
Herbicide resprouts	$1,000	Once	LP	
Mow annually	$500	Annually	P	

1. Licensed Professional Required (LP), Professional (P) or Volunteer (V).

2. To be completed as part of regular meadow mowing for nominal additional cost.



Map 1. Heart-Shaped Field Management Units.

2008 MassGIS aerial photo.

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Great Meadow

As with the other meadows, the Great Meadow has seen an overall improvement in conditions thanks to the initial invasives treatment and follow-up mowing; yet additional, targeted invasives treatment is required to maximize habitat value in the meadow and to reach the point where mowing alone can maintain the meadow. As in the other meadows, invasives persist in two ways: growing in areas where the mower can't reach, refugia such as on rock outcrops, stone walls, or near the base of trees; or as low-growing individuals throughout the mown areas of the meadow. The following recommendations are focused on eliminating refugia where possible, targeting intensive treatment in areas where the mowing interference cannot be removed entirely, and applying a broadleaf herbicide to the bulk of the meadow to reduce cover of invasives and favor grasses.

The length of the stone wall on the east side of the meadow, along the entry path, remains overgrown with a variety of invasive plants (Figure 6). The Committee expressed interest in having this area cleared by Boy Scouts in the past, but there was concern over exposure to poison ivy. I did not observe a high density of poison ivy on my visit, yet given that this is difficult work that would not benefit from half-efforts, I would suggest that the work be completed by Bruce Scherer. As a corollary, I suggest that the trail be re-routed to the east slightly, so that it runs closer to the stone wall. This would allow the currently-mown strip alongside the trail to re-vegetate as shrubland, further buffering the wetland that lies to the west. If budget permits, this area could be planted with native shrubs including dogwoods and viburnums. Recommendations are keyed to management units shown in Map 2.

- Recommendation 1: Clear stone wall in Management Unit 14.
    - Use Davco or other heavy mower to cut woody vegetation along stone wall
    - Apply herbicide as necessary to control growth of invasives on wall
- Recommendation 2: Reroute path entering field
    - Locate trail 10-20 feet further east so that it hugs the newly-cleared stone wall.
    - Allow western portion of currently-mown strip to revegetate.

Several small, poorly-formed or declining trees have been left standing in the meadow and are currently hindering management through mowing (Figure 7), especially in Management Unit 21. Black cherries and pin cherries have been left standing in the eastern end of the meadow and a few white ashes and black locust have been left in Management Unit 20. While the initial improvements to the meadow took a go-slow approach in terms of removing trees, acknowledging that it's hard to put trees back once they've been cut, these small individuals have proved to be a major barrier to controlling invasive species. The mower is not able to get all woody species, such as glossy buckthorn, that grow near the base of these trees. Cherries do provide a food resource for a wide variety of birds and invertebrates, however in the overall interest of habitat maintenance at the meadow, I would recommend that several of them be removed. Several of the white ashes are in poor condition, and the black locust is itself listed as an invasive plant in Massachusetts. The individual trees to be removed should be selected by a group from the Land Management Committee and volunteer stewards and others with knowledge of the fields.

- Recommendation 3: Remove poorly-formed cherries in east end of meadow and white ashes in western end
    - Select trees to be removed.
    - Cut trees low to the ground.
    - Remove all invasives near the base of each tree.
    - Follow up with herbicide treatment as necessary to eliminate invasives.
- Recommendation 4: Remove black locust in western end of meadow.
    - Utilize bark application of herbicide or other approach targeting control of this invasive.
    - Follow up with monitoring to prevent spread of black locust in meadow.

As with the other meadows, black swallowwort, oriental bittersweet, and glossy buckthorn, are present throughout as low-growing individuals persisting despite regular mowing (Figure 8). Black swallowwort especially has spread from a small infestation in Management Unit 13 to the entire east end of the meadow. A broadleaf herbicide should be applied to dramatically reduce these species.

- Recommendation 5: Control the invasive plants in the meadow (including the rock outcrop) in 2014 with an herbicide that targets broad-leaf species.
    - Mow the entire field in early May, 2014.
    - Apply an herbicide that targets broad-leaf species, sparing the grasses.
    - Mow the field again in September, 2014.
- Recommendation 6: Restore wildflower diversity by over-seeding grasses with a native wildflower mix.
    - Mow the entire field in May, 2015.
    - Distribute a wildflower mix such as the Northeast Pollinator Mix for Ernst Conservation Seeds (XERC00103).

Woody invasives are also found at high density in hard-to-mow places, such as around individual boulders or rock outcrops throughout the meadow (Figure 9). These locations should receive intensive invasives control with herbicide and then be planted with native shrubs to out-compete invasives in the future.

- Recommendation 7: Plant shrubs around boulders and rock outcrops.
    - After application of herbicide (September 2014 or May 2015), plant native shrubs at high density around rock outcrop so invasives will be suppressed; species should include bayberry, sweet gale, and low bush blueberry.
    - Continue to monitor these locations for woody invasives and cut or remove by hand.

The initial inventory noted several Tree-of-heaven individuals in Management Unit 8 in the southwest corner of the meadow. These trees are still present, including some very large trees. Tree-of-heaven, wind-dispersed and an aggressive invader, has spread into the Heart-shaped field and is appearing in other locations. Controlling this stand should be a high priority.

- Recommendation 8: Use herbicide (cut-and-paint or bark application) to eliminate this stand of Tree-of-heaven.

Initial invasives treatments included efforts to reduce Japanese knotweed in Management Unit 9, including supplemental planting. The supplemental plants are growing, but Japanese knotweed has not been eliminated and in some places is over-topping the planted species, to the point where the new plantings will fail if knotweed is not further controlled.

- Recommendation 9: Apply herbicide with a foliar application or stem injection where necessary to eliminate Japanese knotweed.

I observed one patch of porcelainberry in Management Unit 7, an invasive species that was not recorded in the previous inventory. This species should be eliminated before it takes off in fields.

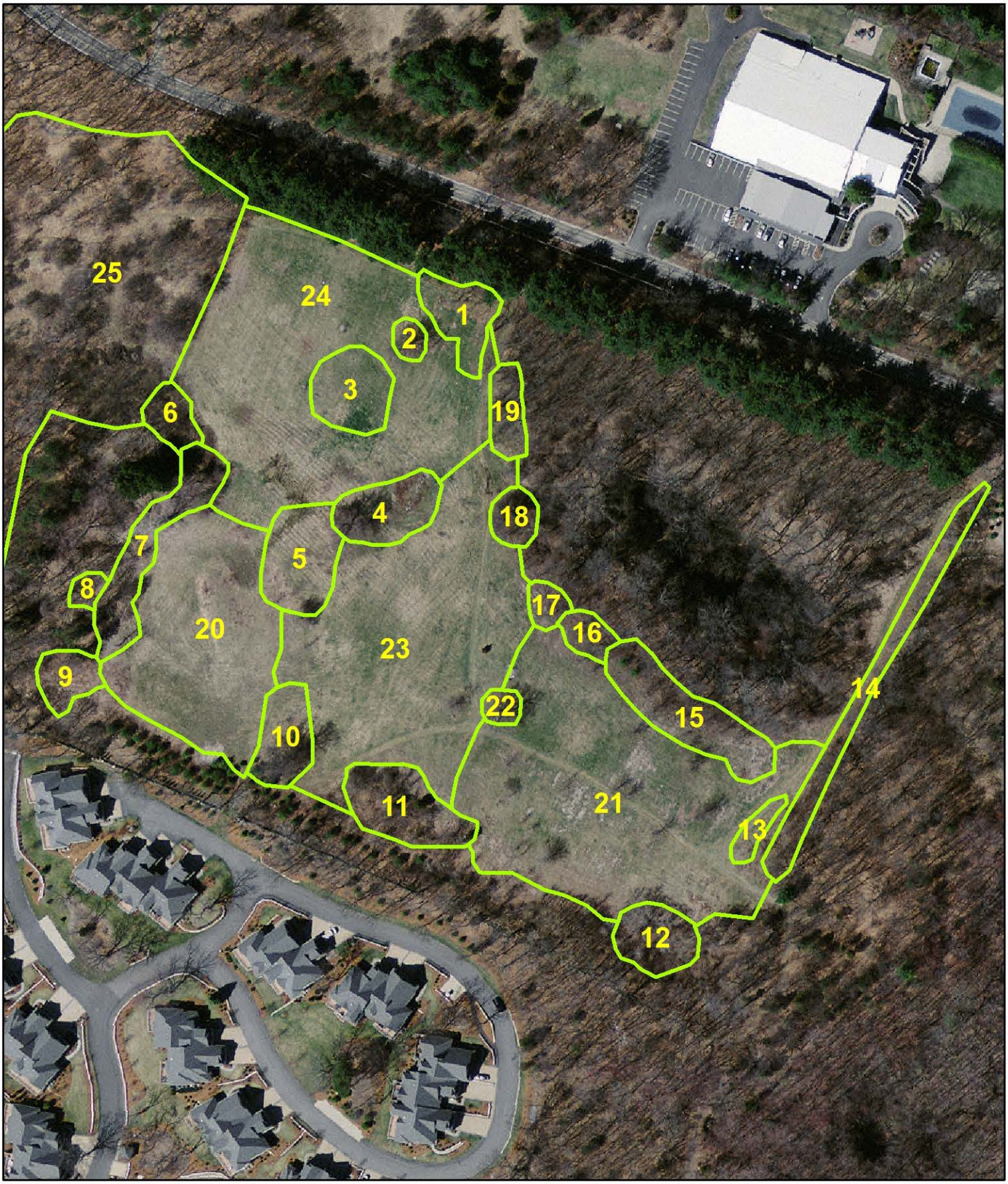
- Recommendation 10: Target porcelainberry on western edge of meadow.

Table 2. Recommended management actions for the Great Meadow sorted by priority.

Recommended Action	Estimated Cost	Frequency	Experience Needed[1]	Priority
Control invasives throughout field				
Mow field in May	$500	Once	P	High
Apply herbicide to field	$1,000	Once	LP	
Mow field in September	$500	Once	P	
Control tree-of-heaven				High
Treat trees with herbicide	$1,000	Once	LP	
Monitor and cut stems	free	Annually	P or V	
Suppress invasives on outcrop				High
Plant shrubs	$2,000	Once	P	
Hand pull black swallowwort	Free	Annually	V	
Remove bittersweet from trees				High
Hand cut and herbicide	$1,000	Once	LP	
Follow up clearing	Free	Annually	P or V	
Seed with wildflowers	$2,000	Once	P	Medium
Remove cherries and aspens				
Cut trees low to ground	$1,000	Once	P	Medium
Remove invasives	$500	Once	P or V	
Follow up with herbicide	$1,000	Once	LP	
Remove black locust				Medium
Apply herbicide to bark	$500	Once	LP	
Monitor to prevent spread	Free	Annually	P or V	
Control Japanese knotweed				Medium
Apply herbicide	$1,000	Once	LP	
Monitor	Free	Annually	P or V	
Control porcelainberry				Medium
Apply herbicide	$500	Once	LP	
Monitor	Free	Annually	P or V	
Clear stone wall along east side				Low

Clear with heavy mower	$750	Once	P	
Herbicide resprouts	$500	Once	LP	
Reroute path				Low
Bring path closer to cleared wall	Free	Once	V	
Revegetate currently mown strip	Free	Once	P or V	

1. Licensed Professional Required (LP), Professional (P) or Volunteer (V)



Map 2. Great Meadow Management Units.

2008 MassGIS aerial photo.

0 50 100 150 Meters

Barn Meadow

The Barn Meadow has been improved through regular mowing since 2006, yet invasive shrubs sustain themselves where the mower cannot reach, and some species have spread throughout the field despite the mowing. Recommendations are keyed to management units shown in Map 3.

Management Units 3 and 4, identified in the 2006 report as separate stands of invasives shrubs, have expanded and merged to become a single contiguous stand and have expanded further into the meadow.

- Recommendation 1: Remove invasive shrubs and treat this area with herbicide.
    - Clear invasive shrubs with a heavy mower in May, 2014.
    - Treat re-sprouting plants with a broad-leaf herbicide.
    - Mow the area again in September, 2014 and in subsequent years.

The tree in Management Unit 7 now has invasive shrubs growing around its base and oriental bittersweet growing into the canopy.

- Recommendation 2: Remove oriental bittersweet and other shrubs
    - Clear invasives with heavy mower and disk trimmer
    - Apply herbicide to cut stumps to prevent resprouting.
    - Continue to treat with disk trimmer when the meadow is mown.

Tree-of-heaven has begun to grow in a pile of boulders near the former house site and along the driveway to the Rock Meadow parking area (Figure 16).

- Recommendation 3: Remove boulders so this area can be mown.
    - Relocate boulders off-site or to the edge of the field.
    - Cut tree-of-heaven and paint herbicide on stumps, or use other appropriate method.
    - Mow this area as part of field.
- Recommendation 4: Control tree-of-heaven along driveway.
    - Cut tree-of-heaven trees and apply herbicide to stumps or use other appropriate method.

Invasives grow under trees and amidst boulders in Management Unit 8 (Figure 19)

- Recommendation 5: Remove boulders and control invasives.
    - Remove stones off-site or to the edge of the field
    - Cut invasive shrubs with heavy mower or disk trimmer.
    - Treat invasives re-sprouts with appropriate herbicide.
    - Follow up with regular mowing and disk trimmer to prevent re-growth of invasives.

Black swallowwort, glossy buckthorn, and oriental bittersweet are present in the field (Figures 20 and 21).

- Recommendation 6: Use herbicide to remove invasives from field
    - Mow entire field in May, 2014.
    - Apply broad-leaf herbicide to re-sprouts in entire field.
    - Mow field in September, 2014.
- Recommendation 7: Restore wildflower diversity by over-seeding grasses with a native wildflower mix.
    - Mow the entire field in May, 2015.
    - Distribute a wildflower mix such as the Northeast Pollinator Mix for Ernst Conservation

Table 3. Recommended management actions for the Barn Meadow.

Recommended Action	Estimated Cost	Frequency	Experience Needed[1]	Priority
Control invasives throughout field				
Mow field in May	$500	Once	P	High
Apply herbicide to field	$1,000	Once	LP	
Mow field in September	$500	Once	P	
Control tree-of-heaven				
Remove boulders	$500	Once	P	High
Treat trees with herbicide	$500	Once	LP	
Mow annually	$0[2]	Annually	P	
Seed with wildflowers	$500	Once	P	Medium
Control invasives in Stand 8				
Remove boulders	$500	Once	P	Medium
Cut invasives	$500	Once	P or V	
Treat with herbicide	$1,000	Once	LP	
Mow annually	$0[2]	Annually	P	
Clear shrubs in Stands 3 and 4				
Clear with heavy mower	$1,000	Once	P	Medium
Herbicide resprouts	$1,000	Once	LP	
Mow annually	$500	Annually	P	
Remove oriental bittersweet and shrubs from Stand 7				Medium
Clear invasives	$1,000	Once	P or V	
Treat with herbicide	$1,000	Once	LP	
Hand cut annually	Free	Annually	P or V	

1. Licensed Professional Required (LP), Professional (P) or Volunteer (V)
2. To be completed as part of regular meadow mowing for nominal additional cost.

Map 3. Barn Meadow Management Units.

2008 MassGIS aerial photo.

0 50 Meters

Conclusion

The Committee's investment in habitat improvement in the three meadows has been successful in reducing the extent of woody invasives in the meadows themselves, increasing diversity of flowering species, and expanding the amount of grassland habitat. But the work is ongoing. Invasive plants remain a major management concern, and they will continue to be as many of the targeted species are present in the landscape surrounding the meadows. Nonetheless, I believe that targeted treatment, with herbicides as necessary, will greatly reduce the cover of invasives plants, improve habitat for native birds and invertebrates, and reduce future costs as a point is reached where the fields can be managed primarily with seasonal mowing.

 (a)  (b)

Figure 1. Google Earth aerial photos of the Heart-shaped Meadow in (a) July 2005 and (b) August 2013.

 (a)  (b)

Figure 2. Google Earth aerial photos of the Great Meadow in (a) July 2005 and (b) August 2013.

 (a)  (b)

Figure 3. Google Earth aerial photos of the Barn Meadow in (a) July 2005 and (b) August 2013.

Figure 4. Heart shaped meadow, view into stone wall along west side, and nice granite post obscured by vegetation, including Tree-of-heaven (brown bark with white speckles).

Figure 5. 15-20 feet of invasives along the stone wall on west side of Heart-shaped Meadow.

Figure 6. View south along pathway from Concord Road to Great Meadow. Recommend clearing vegetation on left (east) side, shifting path to left so it hugs the stone wall a bit more, and allow area on right (west) to revegetate.

Figure 7. View west in Great Meadow. Note invasives at base of trees. These cherries should be cut down so that invasives can be cut out with mower.

Figure 8. Thick oriental bittersweet, glossy buckthorn, and black swallowwort in Great Meadow require herbicide.

Figure 9. Rocks throughout Great Meadow harbor invasives. Target these areas for intensive planting with bayberry, sweet gale, sweet fern, etc.

Figure 10. View south. Recommend removing two trees on the right to improve access to invasives.

Figure 11. A rock that has remained uninvaded, somehow.

Figure 12. An invaded rock. Remove glossy buckthorn and replant with native shrubs.

Figure 13. Would be nice to push this edge back, at southwest corner of meadow.

Figure 14. Another angle of two small trees that should be removed.

Figure 15. Black swallowwort in Great Meadow.

Figure 16. Tree of heaven on rock pile in Barn Meadow.

Figure 17. Glossy buckthorn under trees in Barn Meadow

Figure 18. Glossy buckthorn along street. Should be removed to maintain nice visibility into meadow.

Figure 19. Rock line that harbors glossy buckthorn, would be nice to move stones so that invasives can be managed with mowing

Figure 20. Glossy buckthorn in mown area of Barn Meadow

Figure 21. Oriental bittersweet in mown area of Barn meadow. Needs herbicide to knock it out.

McLean Open Space Photos 10/10/13

Appendix A. Recommendations for Field Management at the McLean Open Space, 2006