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Recommendations for Restoration of Meadow Habitat at Arlington's Great Meadows

Final Report to Friends of Arlington's Great Meadows
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Mass Audubon works to protect the nature of Massachusetts for people and wildlife. Together with more than 100,000 members, we care for 32,000 acres of conservation land, provide educational programs for 200,000 children and adults annually, and advocate for sound environmental policies at local, state, and federal levels. We are the largest conservation organization in New England. Our statewide network of 45 wildlife sanctuaries welcomes visitors of all ages and serves as the base for our conservation, education, and advocacy work. Through the Ecological Extension Service, Mass Audubon is able to share with conservation partners our broad experience in natural resource inventory and conservation land management based on the work we do on our own wildlife sanctuaries.

Purpose

This report was completed at the request of the Friends of Arlington's Great Meadows in order to inform decision-making regarding maintenance of open meadows on the Great Meadows property. Since undisturbed meadows will eventually be overtaken by fast-growing woody plants over time, in a process known as old-field succession, it is necessary to maintain fields and meadows by introducing disturbance such as mowing or grazing. A natural resource inventory of the area completed by Frances Clark in 2001 concluded that the open meadows on the site were of particular value to a wide range of plants and animals. Since a majority of Arlington's Great Meadows is forested or wetland, these open areas contribute significantly to the overall habitat diversity of the site.

With early-successional natural communities such as grasslands and shrublands in decline across our region, the plant and animal species that rely on them are also in decline. It is of particular importance to recognize high quality grassland and shrubland habitat and to manage it in a way that maintains its highest habitat value while accommodating other values of the site. The recommendations in this report should serve as a starting point for decision-makers in Arlington and Lexington to discuss the best course of action to balance habitat maintenance and protection and public use of the site.

This project did not involve any delineation of wetland boundaries in the areas adjacent to the meadows. Altering vegetation in the wetland buffer is regulated under the Wetlands Protection Act and town bylaws. Any vegetation management activities should be planned in consultation with the Lexington Conservation Commission to ensure that bylaws are adhered to and wetland resources are protected in the effort to maintain open habitat.

There are four areas identified as early successional in the Clark report – the grassland, two grassland/shrub areas, and an area of early successional forest. I twice visited the site with members of the Friends of Arlington's Great Meadows board to identify the areas of interest. We followed up with an exchange of draft maps to locate them in more detail. For this report, we were asked to look at the "grassland" as identified by Clark, a small patch of the "grassland/shrubland", and the central area of the "early successional forest". The early successional forest actually lies on Joyce Miller's Meadow, a conservation lot owned by the Town of Lexington. We refer to the grassland as the Entry Meadow, the small patch of grassland/shrubland as the Small Meadow, and the early successional forest as the Shrubby Meadow (Map 1).

Site Description & Management Recommendations

Entry Meadow – This 5-acre area extends from the trailhead and entry sign at the northwest, to the oak woodland hillside at the northeast, to the pitch pine woodland at the southeast and the marsh at the southwest. The meadow and adjacent areas are divided into nine stands based on dominant vegetation.

As Clark reports, the grassland is dominated by little bluestem and other grasses, with wildflowers and woody shrubs ranging from uncommon to co-dominant. Small tree species and shrubs have begun to pioneer in the grassland, and given time, will come to completely dominate this area, shading out the grasses and thoroughly changing the habitat and aesthetic characteristics of the site. The detailed comments below are keyed to Map 2.

Unit	Description	Management Recommendation
1 0.46 acres	A half acre area of widely-spaced trees and shrubs growing over grasses. Mature black and white oaks stand along the stone wall on the north side of this unit. A lobe of small trees, including black and white oak and black cherry, with lower-growing bear oak shrubs, extends a short distance (~50 feet) south from the wall, into the meadow. Between these oaks and the walking trail is a more open area with pioneer species including gray birch and quaking aspen, glossy buckthorn, highbush blueberry, a few black oak, black cherry, white pine, some patches of lowbush blueberry and huckleberry.	Large oaks along wall should be left untouched and few smaller oaks could remain a short distance into meadow. Bear oaks should remain. Other woody species should be removed, especially birches, aspens, white pines, and cherries. Particular attention should be paid to removing glossy buckthorn. No restoration necessary since grasses are quite well established between woody plants.
2 0.18 acres	This is the large, dense shrub stand immediately opposite the information kiosk. Dominated by staghorn sumac and gray dogwood with a few medium-sized black cherries. Glossy buckthorn and honeysuckle shrubs make up a large component on the southern side.	Left unmanaged, this stand will continue to expand east further into the meadow. The entire stand should be removed. Will require several years of mowing or hand removal of resprouts to favor grasses and wildflowers over woody species. Some seeding or restoration may be necessary.
3 0.25 acres	A stand of tall quaking aspens with black cherry, glossy buckthorn, honeysuckle shrubs, multiflora rose, and staghorn sumac underneath.	Invasives find harbor under the taller trees of this stand and provide seed source for reinvasion of the meadow. Invasive control efforts should include a focus on this stand. Clearing the eastern lobe of this unit would contribute to enlarging the meadow and limit the spread of aspens in the grassland.
4 0.27 acres	A dense stand dominated by young quaking aspens with some gray birch. Goldenrods, other wildflowers and grasses dominated the groundcover.	This section lies on lower ground quite close the wetland edge; some of the unit may be wetland itself. Would be advantageous to remove as much of this stand as is practicable while maintaining wetland buffer, especially on the eastern edge adjacent to the meadow.
5 0.49 acres	The remaining heart of the formerly open meadow. A few pioneering quaking aspens are found, growing over little bluestem, goldenrods and other grass and wildflower species. There are a few invasive plant locations, but the vegetation, largely controlled by the dry soils, is closest to the variant sandplain grassland community described by Clark.	All quaking aspen should be cleared from this unit. Entire area should be managed to limit regrowth of woody species. The grassland will need no restoration.

6 0.93 acres	A section of the meadow with slightly higher density of pioneering tree species than Unit 5. Quaking aspen is replaced by gray birch growing sparsely, with some glossy buckthorn. Grasses, wildflowers, and lowbush blueberry dominate the groundcover.	Same as Unit 5. Should remove all gray birch and treat glossy buckthorn. As with Unit 5, grassland community will need no restoration after removal and control of woody stems.
7 1.05 acres	Similar to Unit 6, but with gray birch and glossy buckthorn growing at higher density. Multi-stemmed gray birch copses throughout suggest that this area was mown or hand-cut 10-15 years ago. Grasses dominate underneath. Merges with oak-pitch pine stand at southeast.	Management of this area will require more effort than Units 5 and 6, but would nearly double the area of the grassland. Gray birch stumps will likely need herbicide treatment to prevent resprouting. Oaks and pitch pines should be left.
8 0.80 acres	Dense young quaking aspen with staghorn sumac, black cherry and glossy buckthorn growing from meadow to wetland edge. Grasses and wildflowers growing underneath.	Clearing along the grassland edge of this unit would serve to expand the grassland marginally, but should be planned so as to limit disturbance of wetland buffer. Smaller aspens on edge of stand and individual shrubs near trail should be removed.
9 0.53 acres	A taller, less dense stand of quaking aspen and gray birch between the grassland and the wetland. Very open underneath with grasses dominating the groundcover.	Tempting to remove a section to improve view of marsh from meadow trail, but unnecessary from grassland management perspective.

Small meadow – A 0.44 acre area identified by FoAGM board members as of potential interest for restoration to a more open condition, indicated as Section 10 on Map 2. The area, which appears to have been open formerly, now includes several multi-stemmed gray birch copses and patches of glossy buckthorn. While a restored grassland community here would not be of tremendous habitat value, it would likely provide a supplemental resource for invertebrates drawn to the main grassland and it would offer a pleasant aesthetic diversion from the adjacent trail. Hand removal of gray birches and glossy buckthorn could be accomplished with hand tools, but these species would grow back without herbicide treatment or follow up mechanical control. The ground layer is well vegetated with grasses and other herbaceous species, so no restoration would be necessary after removal of woody vegetation. Glossy buckthorn is thick in the surrounding forest and threatens to completely invade this small opening in the future.

Shrubby Meadow – A 2.7-acre former meadow now mostly grown in with young trees and shrubs. Glossy buckthorn is present in most parts of this meadow and thick in some locations. Staghorn sumac, apple, cherries, and oaks provide food for a variety of wildlife. The detailed comments below are keyed to Map 3.

Unit	Description	Management Recommendation
11 0.39 acres	A line of large black oaks grows along a stone wall which marks the boundary between this meadow and the footpath running to the north of the meadow. Glossy buckthorn grows very dense underneath these oaks.	The very attractive, mature oaks should stay. Any effort in this area should focus on removing as much glossy buckthorn as possible.
12 0.32 acres	This 0.3-acre section is largely open with birches and cherries growing above a grass-dominated groundcover.	This stand has relatively few non-native invasive species, but the birches and cherries will continue to move this stand from grassland to shrubland. To maximize extent and value of meadow habitat, this stand should be cleared out if section 13 is cleared.
13 0.44 acres	Stand of young, densely-growing black oak, aspens, cherries, apples, and staghorn sumac, thoroughly invaded with glossy buckthorn. Sparse groundcover growing underneath thick, ~10-foot 'canopy' of shrubs. Thick glossy buckthorn continues southwest of area identified on map as Section 3, across footpath.	This stand should be cleared along with section 12. Conversion to grassland or meadow habitat will require several years of monitoring and follow-up effort to reduce woody cover. With repeated mowing and no seeding, nearby meadow species would establish within the newly cleared ground. Supplemental seeding with native grass and wildflower seeds would be advantageous to outcompete woody species and non-natives. Restoration extending southwest, across footpath, into additional glossy buckthorn area would reduce seed source of invasives and expand extent of meadow habitat.
14 1.26 acres	The most open area of this meadow, with a few tall black oaks , some black cherry and gray birch, apples, a stand of staghorn sumac at the north end, and glossy buckthorn present throughout. Of all sections of this meadow, the groundcover in this section most closely resembles a target mix for meadow habitat. The forest extending east, towards the wetland, is densely invaded with honeysuckles.	Effort should focus on removing small trees in this section, beginning on the east side and extending downslope to the east to the extent feasible, with a focus on controlling glossy buckthorn. The few apples should be left as food sources if possible. Meadow habitat could extend nearly to trail running north-south along wetland edge, but this would require a massive effort to remove thick honeysuckle stands in shrub layer.
15 0.34 acres	A line of large black oaks extending from the stone wall in section 1 into the center of this meadow. Glossy buckthorn grows underneath.	Larger meadows tend to provide habitat for a wider variety of species. This line of oaks breaks this former meadow into two smaller patches thus detracting from the potential value of meadow habitat; but since the total area of meadow, even if all woody vegetation were cleared, is less than 3 acres, leaving the oaks standing for sources of cover and food would be the best approach. Glossy buckthorn growing underneath the oaks should be cleared.

Discussion

Entry Meadow – This meadow area is being invaded by both native and non-native woody pioneer species. If left unmanaged, the shrubs and small trees will continue to expand and within ten years the area will change from somewhat open meadow to an old-field condition dominated by saplings and shrubs. Although shrubland habitat is a desirable and increasingly uncommon wildlife habitat, the multiple values of habitat quality, natural community diversity, user experience, and aesthetics would argue for maintaining this area as an open grassland.

The extent of grassland habitat should be maximized here by removing pioneer species such as gray birch, quaking aspen, and black cherry. Removal of woody vegetation should take care to leave sufficient wetland buffers intact. Stands of invasive species and stump-sprouting woody species should be monitored for regrowth and retreated. Treatment can rely exclusively on mechanical removal with chainsaw and Brush-Hog-type equipment, or include judicious use of chemical herbicides to reduce resprouting of invasives and aggressive stump sprouters. Any vegetation management or use of herbicides in the wetland buffers should be reviewed by the Conservation Commission. The current extent of desirable meadow species means that very little, if any, reseeding is necessary in this meadow.

Restored in this way, the Entry Meadow would total roughly five acres of contiguous sparse grassland. While this size is below the area threshold for nesting habitat of the less common grassland breeding birds such as savannah sparrow, bobolink, and eastern meadowlark, the enlarged grassland area will benefit a wide variety of invertebrate species as well as grassland-specialized plants. While much discussion of grassland conservation focuses on large expanses of grassland, which can accommodate species which require large areas, these smaller grasslands are also important pieces of a diverse landscape.

Small Meadow – Do not expend too much effort on restoration activities in this area. This little forest opening is too small to be of significant habitat value to species seeking open grassland or meadow habitat. Decisions on its management should be made based on other factors including aesthetics.

Shrubby Meadow – Old field succession, the process by which an abandoned field is slowly converted back to forest, has taken its first steps in this former meadow. The meadow could be restored to a grass and wildflower dominated community with considerable effort focused on removal of dense stands of both native and non-native shrubs as described in the detailed comments. Since the modest size of this meadow will keep it from functioning as grassland habitat for a wide variety of species, it might better be managed as a tree-studded meadow, presenting a different aesthetic quality than the entry meadow. Retaining food tree species could lead this open area to perform a habitat role akin to an orchard, with birds and small mammals drawn to the abundant fruits of apples, cherries, and oaks.

Another alternative is to allow this meadow to continue as shrub-dominated cover to provide habitat for shrub-nesting birds and other wildlife that prefer this successional stage. Shrubland habitat is disappearing at an even faster rate than grassland in our region, and populations of shrubland nesting birds are facing a parallel decline. Managing the area as shrubland would require little effort in the near term, but would call for occasional removal of taller-growing species, such as oaks and maple saplings, to prevent succession to a forested stand. Since this meadow includes a combination of shrubs and saplings, it could possibly be managed with hand removal of the saplings of the taller-growing species such as oaks and maples, while retaining the sumac, apples, gray birch, quaking aspens, and pin cherries. This approach would require that individual trees be identified for removal. The more common method of shrubland management is to periodically cut the shrubby growth back with a heavy-duty mower deck

such as a Brush-Hog. This method may be faster, but the area serves as poor habitat in the year immediately following mowing, and equipment costs and access issues may complicate such an approach in this meadow. Neither method would be likely to suppress invasive shrub species.

Conclusion

As stated in the introduction, maintenance of early successional habitats such as grasslands and shrublands in our region generally requires some sort of disturbance to prevent succession to forest. Historical natural disturbances included grazing by large herbivores, fire, forest disease, and flooding. Since we have largely removed these processes from our landscape, early successional habitats require our intervention; we need to introduce the disturbance. Managing the Entry Meadow as an open grassy meadow and the Shrubby Meadow as a treed meadow or as a shrubland would contribute to increased overall habitat diversity at Arlington's Great Meadow as well as enhance the aesthetic diversity of the property.

Mowing and brush-cutting, burning, and grazing have all been used effectively to create and maintain early successional habitat. Mowing is generally the least expensive and most feasible method. Herbicides may also be appropriate, both to control invasive species and to maintain a grassland or low shrub community by removing individual plants such as fast-growing pioneer tree species. Invasive species control with herbicides is highly species-specific, with the actual chemical as well as the application method varying from plant to plant. Herbicide should ideally be applied with only the most low-impact methods, such as basal bark, stem injection, or stump painting.

Map 1 -- Early Successional Areas
Arlington's Great Meadows Vegetation Management Plan

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Map 2 -- Entry Meadow & Small Meadow
Arlington's Great Meadows Vegetation Management Plan

management units estimated wetland edge

0 50 100 Feet

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Map 3 -- Shrubby Meadow
Arlington's Great Meadows Vegetation Management Plan

0 50 100 Feet

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Appendix A – Grassland Section from Clark (2001) Report