Botanical Survey of Bussey Brook Meadow

Jamaica Plain, Massachusetts

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Prepared for the Arboretum Park Conservancy
Funded by the Arnold Arboretum Committee

Conducted 2005

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INTRODUCTION

The New England Wild Flower Society (NEWFS) conducted a botanical survey of Bussey Brook Meadow for the Arboretum Park Conservancy during the 2005 growing season. The Arnold Arboretum Committee funded the survey project and the Arboretum Park Conservancy administered it. The Arnold Arboretum was established in 1882, as a mutual indenture between Harvard University and the City of Boston. The Arboretum Park Conservancy advocated for the City of Boston and Harvard University to add an additional parcel to the indenture. In 1996, the 24-acre Bussey Brook Meadow was added to the Arboretum, marking the first addition to the property since 1895. Bussey Brook Meadow offers valuable opportunities for visitor access via public transportation, environmental education, and interpretation and research of an urban wild.

The Bussey Brook Meadow site has been used in a variety of ways in the past. Harvard University used it as a nursery holding site for the Arnold Arboretum, and there are consequently a number of foreign shrub and tree species remaining on the property. The City of Boston had a dumpsite on the property, which is no longer used and is now covered by a growth of trees and vegetation.

Currently the property serves as a lowland impoundment for rainwater and an access area from the Forest Hills public transit station via the Blackwell Footpath to other parts of the Arboretum. This footpath was added to the property in 2001 to encourage use of the urban wild. At this time, new entrance gates were placed at each end of the path. The footpath begins at the Forest Hills Station and winds its way to South Street and the original Arboretum South Street gate. Bussey Brook runs through the property, and flows below ground near the eastern edge of the property. The brook and the rainwater impoundment join to create a wetland in the spring and early summer that provides habitat for wildlife.

The easy public transit access to this urban wild, along with its wetland and meadow habitats, are the primary reasons that the Conservancy facilitated adding the property to the indenture. The site has great potential for education and interpretation, in addition to its availability for public enjoyment and research opportunities.

Bussey Brook Meadow is located near the South Street entrance of the Arnold Arboretum, between South Street, and the Bay Colony railroad tracks in Jamaica Plain, Massachusetts. The property can be accessed from either South Street or Washington Street. See Figure 2 for an aerial photo of Bussey Brook Meadow, with the property boundaries outlined in red.

The purpose of the botanical survey was to 1) document the plant species occurring on the property; 2) provide brief descriptions of the plant communities found; 3) make management suggestions based upon these findings; and 4) serve as the background for future education programs on the property.

Figure 1. Bussey Brook Meadow Location Map

METHODS

The property was visited four times throughout the 2005 growing season on May 11th, June 15th, July 29th, and September 23rd. Multiple visits were made to observe species during their flowering and fruiting times to facilitate identification. The New England Wild Flower Society staff and Plant Conservation Volunteers conducted the surveys, which generally occurred from about 10:00 a.m. to 3:00 p.m. All areas were surveyed on foot.

The group identified common plants as they were encountered using wildflower, grass, and tree/shrub guides. More difficult specimens were keyed out in the field using *Manual of Vascular Plants of Northeastern United States and Adjacent Canada* (Gleason and Cronquist, 1991) and other keys. In some cases, specimens were collected for identification at NEWFS headquarters in Framingham, Massachusetts. During the third and fourth visits to the site, temporary plots were established in each of the identified natural communities at the site. Plots were used to collect information on the community's structure and relative abundance of species.

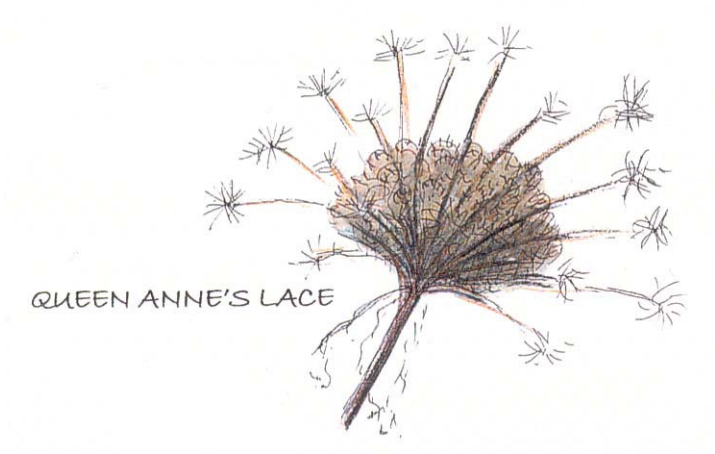
Natural communities were determined using *Classification of the Natural Communities of Massachusetts* (Swain and Kearsley, 2001). The descriptions of the natural communities we observed at Bussey Brook Meadow are attached in Appendix 2. Plants were considered invasive if listed as "invasive," "likely invasive," or "potentially invasive" in *An Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts, with annotated list* (Massachusetts Invasives Plant Advisory Group, 2005). A complete list of references is given at the end of this document.

Figure 2. Bussey Brook Meadow. Aerial image with property boundaries.

RESULTS

Plant Species

A total of 322 plant species were observed on the property at Bussey Brook in 2005. Appendix 1 provides a list of these species by growth habit (forbs; graminoids; trees, shrubs, and vines; and ferns and fern allies). Nomenclature follows *Flora Novae Angliae* (Haines, 2005). The list includes 170 herbaceous forb species (52.8% of all species); 43 graminoids (13.3%); 102 tree, shrub and vine species (31.7%); and seven ferns and fern allies (2.2%). Of these, 172 are native species and 150 are non-native species. Thirty-three of these non-native species are invasive. Overall, 53.4% of the species we observed at Bussey Brook Meadow are native and 46.6% are non-native. Invasive species comprised 10.2% of the species observed.



Natural Communities

We observed six different natural communities at Bussey Brook Meadow, shown in Figure 3. The examples of these communities found at Bussey Brook are somewhat atypical for Massachusetts, due to the large number of exotic species present at the site. Some of these species were planted by the Arnold Arboretum staff and still possess labels; others probably spread unintentionally from the Arboretum or other adjacent lands. The natural communities we observed at Bussey Brook Meadow are described below, including the common species found there. The official community type name from Swain and Kearsley (2001) is given in parentheses. (Descriptions of the natural community types excerpted from this text are attached in Appendix 3.)

A. Mesa

Along South Street at the northern edge of the property, there is a mesa, or hill with a flat top. The mesa was the site of an old dump, and its top is an open disturbed area undergoing succession, with a few large trees scattered in the middle and many weedy and invasive species. This site does not fit into any described natural community in Massachusetts from Swain and Kearsley (2001), as many of the canopy and shrub species are nonnative. The large trees in the mesa are predominantly English elm (*Ulmus procera*). The shrub layer below consists of scattered white ash (*Fraxinus americana*), river grape (*Vitis riparia*), American elm (*Ulmus americana*), box-elder (*Acer negundo*), and staghorn sumac (*Rhus typhina*), as well as several highly invasive species, including Asiatic bittersweet (*Celastrus orbiculatus*), Japanese knotweed (*Fallopia japonica*), multiflora rose (*Rosa multiflora*), and black swallowwort (*Cynanchum louisae*). In the herbaceaous layer, Queen Anne's lace (*Daucus carota),* ragweed (*Ambrosia artemisiifolia)*, white vervain (*Verbena urticifolia,)* daisy fleabane (*Erigeron annuus*), evening primrose (*Oenothera biennis*), and rough-stemmed goldenrod (*Solidago rugosa*) are abundant. Beneath these taller plants, the dominant species are lamb's quarters (*Chenopodium album*), garlic mustard (*Alliaria petiolata*), lady's thumb (*Persicaria maculosa*), English plantain (*Plantago lanceolata*), and enchanter's nightshade (*Circaea quadrisulcata*).

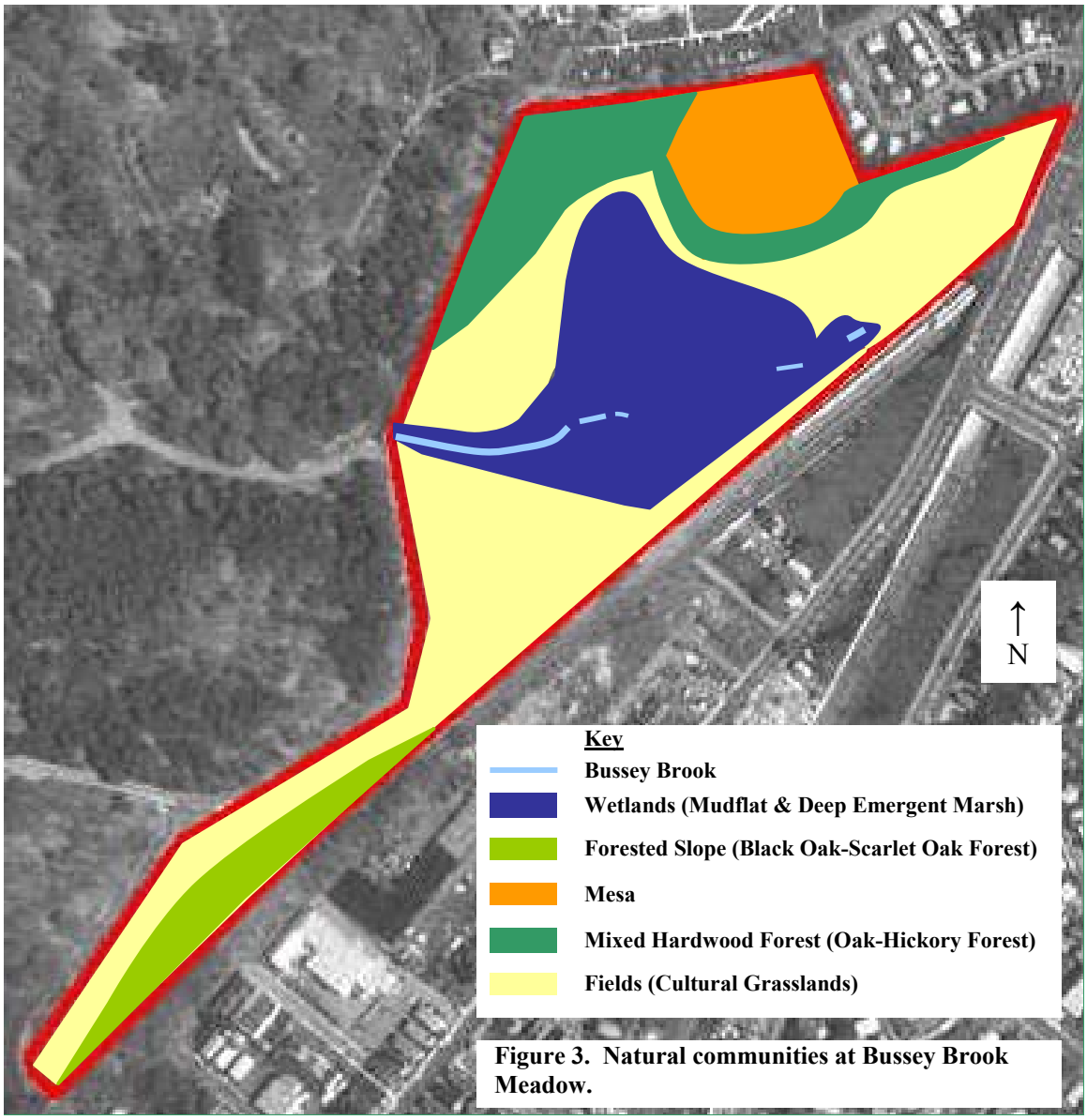


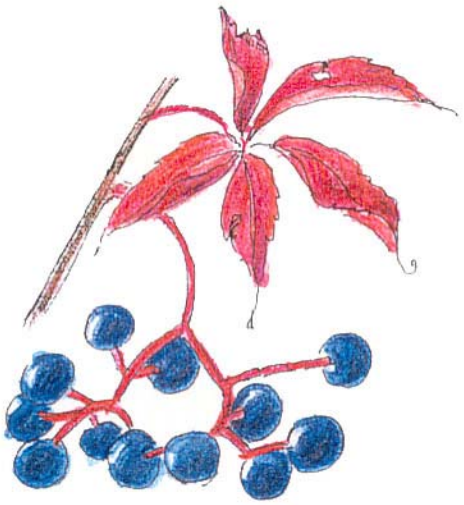
Figure 3. Natural communities at Bussey Brook Meadow.

B. Mixed Hardwood Forest (Oak-Hickory Forest)

Further west along South Street, between the South Street entrance and the Mesa, is a mixed hardwood forest that is relatively free of invasives. This is an Oak-Hickory Forest natural community, and its dense canopy is comprised of red and black oak (*Quercus rubra* and *Q. velutina*), with a few scattered shagbark hickory trees (*Carya ovata*). Oak, hickory, and black cherry (*Prunus serotina*) dominate the shrub layer, and there are patches of low-bush blueberry (*Vaccinium angustifolium*) and a few individuals of the invasive glossy buckthorn (*Frangula alnus*). Canada mayflower (*Maianthemum canadense*), white wood aster (*Eurybia divericata*), false Solomon's seal (*Mianthemum racemosum*), and common woodrush (*Luzula multiflora*) are the most common herbs in the forest

floor, with occasional late goldenrod (*Solidago gigantea*), wild oats (*Uvularia sessilifolia*), grass (*Poa* spp.), blackberry (*Rubus allegheniensis*), and oak and eastern white pine (*Pinus strobus*) seedlings. A deep ravine cuts through the forest in this area, west of the mesa.

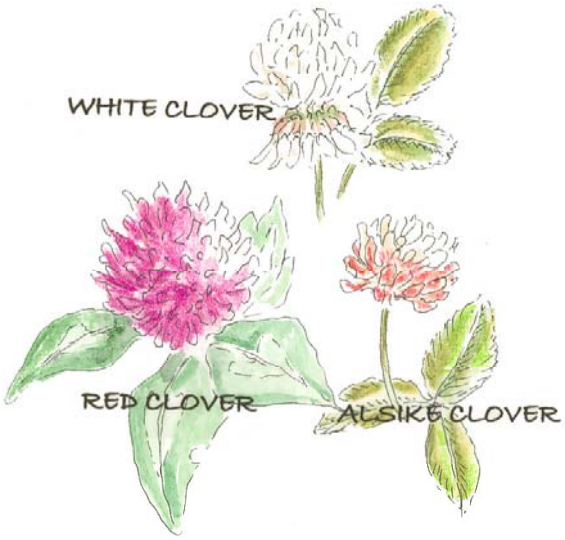
The forest on the east side of the mesa is similar to the mixed hardwood forest described above, but with a much higher percentage of nonnative species. The dominant canopy species in much of this area is tree of heaven (*Ailanthus altissima*), with box elder, glossy buckthorn, common buckthorn (*Rhamnus cathartica*), castor-leaved aralia (*Kalopanax pictus*), and barberry (*Berberis thunbergii* and *B. vulgaris*) common as well. Many of the trees are covered with vines of Virginia creeper (*Parthenocissus quinquefolia*), Asiatic bittersweet, and grape (*Vitis* spp.).



VIRGINIA CREEPER

C. Fields (Cultural Grasslands)

Between the Oak-Hickory Forest and Bussey Brook, there is a field that is maintained by annual mowing. A wide path runs through this field, lined with several large black oak and English elm trees. This Cultural Grassland natural community is thick with herbaceous vegetation, including both forbs and graminoids. The dominant grasses are non-native cool season species, such as fescues (*Festuca filiformis, F. rubra, and F. trachyphylla*), Kentucky blue grass (*Poa pratensis*), orchard-grass (*Dactylis* glomerata), and sweet vernal grass (*Anthoxanthum odoratum*). Common forb species include cow vetch (*Viscia cracca*), Queen Anne's lace, chicory (*Cichorium intybus*), and hawkweed (*Hieracium* spp.). Clovers (*Trifolium pratense* and *T. repens*), plantains (*Plantago major* and *P. lanceolata*), black knapweed (*Centaurea nigra*), swamp-



dewberry (*Rubus hispidus*), tansy (*Tanacetum vulgare*), path rush (*Juncus tenuis*), birdsfoot trefoil (*Lotus corniculatus*), spotted cat's-ear (*Hypochoeris radicata*), and asters (*Symphyotrichum* spp.) are also scattered throughout the meadow, along with a few occurrences of Timothy grass (*Phleum pratense*), ryegrass (*Lolium perenne*), ragweed, yarrow (*Achillea millefolium*), dock-leaved smartweed (*Polygonum lapathifolium*), common milkweed (*Asclepias syriaca*), choke cherry (*Prunus virginiana*), butter and eggs (*Linaria vulgaris*), and brown knapweed (*Centaurea jacea*). Two highly invasive species are also found in this area: Asiatic bittersweet and black swallowwort. There are patches of stag horn sumac and scattered black locust (*Robinia pseudoacacia*) throughout the fields.

On the south side of Bussey Brook, there is a second Cultural Grassland natural community. Portions of this grassland do not contain as many exotic cool season, mat-forming grasses as the field described above. Instead, in many areas the dominant grass is the native warm season little blue stem (*Schizachyrium scoparium*). Other abundant herbaceous species are goldenrods (*Solidago* spp.), tansy, northern dewberry (*Rubus flagellaris*), butter and eggs, common milkweed, and black swallowwort. There are patches of a few woody species, including rugosa rose (*Rosa rugosa*) and black cherry, in this area as well.

D. Forested Slope (Black Oak-Scarlet Oak Forest)

Southwest of the field, an old road runs to the southern boundary, where the property becomes a narrow strip. The road itself is seasonally wet, and wetland species such as rushes (*Juncus* spp.), beggar's ticks (*Bidens* spp), and black alder (*Alnus glutinosa*) are common, along with many of the same asters, goldenrods, and grass species found in the cultural grasslands at the site. On the east side of this old road is South Street, and on the west side is a forested slope consisting of a Black Oak-Scarlet Oak Forest natural community, with many exotic species

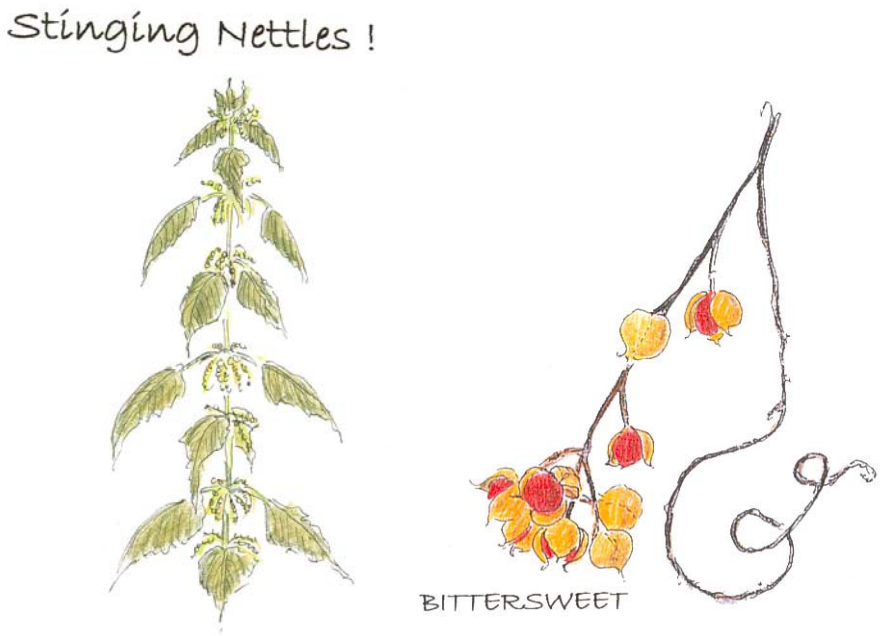
present. This steeply sloped area has a patchy canopy of black oak (*Quercus velutina*), under which an interrupted subcanopy of American elm, gray birch (*Betula populifolia*), and crabapple (*Malus* sp.) grows. The shrub layer consists of scattered crabapple, as well as some Norway maple (*Acer platanoides*) and tree of heaven. Asiatic bittersweet climbs over many of the trees and shrubs. The herbaceous layer is made up largely of garlic mustard and poison ivy (*Toxicodendron radicans*), along with scattered white snake root (*Ageratina altissima*), white wood aster, enchanter's nightshade, and ferns (*Athyrium angustum* and *Dryopteris intermedia*).

E. <u>Bussey Brook and Associated Wetlands (Mud Flat, Deep Emergent Marsh)</u>

Bussey Brook is a seasonal stream, with a wide, gently sloped floodplain area, most of which is a Mud Flat natural community type. The streambed is lined with forty-foot tall weeping willow trees (*Salix* x *pendulina*) and sparse shrubs, including glossy buckthorn, silver maple (*Acer saccharinum*), horse chestnut (*Aesculus hippocastanum*), and privet (*Ligustrum* sp.). There are dense swaths of stinging nettle (*Urtica dioica*) and Jerusalem artichoke (*Helianthus tuberosus*) along the stream, particularly at the eastern end of the property. Common herbaceous plants in the streambed include swamp beggar-ticks (*Bidens connata*), jewelweed (*Impatiens capensis*), reed canary grass (*Phalaris arundinacea*), drooping sedge (*Carex crinita*), dock-leaved smartweed, lady's thumb, purple loosestrife (*Lythrum salicaria*), bittersweet nightshade (*Solanum dulcamara*), yellow flag iris (*Iris pseudacorus*), northern three-lobed bedstraw (*Galium trifidum*), and creeping buttercup (*Ranunculus repens*).

To its north and south, Bussey Brook is bordered by seasonally flooded fields (Cultural Grasslands, as described above) and two patches of Deep Emergent Marsh natural communities. South of the brook, near the graffiti wall, is a dense

stand of cattails (*Typha latifolia*) and purple loosestrife (*Lythrum salicaria*), rimmed with willows (*Salix* spp.) and a thick carpet of lesser celandine (*Rannunculus ficaria*). On the north side of Bussey Brook, between the brook and the path, a second emergent marsh area is comprised mainly of common reed (*Phragmites autralis*), with scattered sedges (*Carex* spp.), bulrush (*Scirpus* sp.) branching bur-reed (*Sparganium eurycarpum*), purple loosestrife, yellow flag iris (*Iris pseudacorus*), beggars ticks (*Bidens* spp.), and water hemlock (*Cicuta maculata*).



DISCUSSION

Bussey Brook Meadow possesses remarkable species and habitat diversity, and an unusual array of species occurs because of its past use as a holding area for the Arnold Arboretum. Because of the history of disturbance at the site, there is a high percentage of invasive and non-native species on the property. Nonetheless, the habitat diversity at the property provides wildlife habitat for a range of different species. The wetland natural communities provide turtle nesting, amphibian breeding, and odonate habitat. Deep emergent marshes are excellent waterfowl habitat, and mallards and other ducks may use the brook and its associated wetlands. The grasslands offer bird, butterfly, mouse, and vole habitat. The forested areas provide habitat for small mammals, such as white-footed mice, gray squirrels, and chipmunks, and birds, including the ovenbird, red-eyed vireo, and white-breasted nuthatch.

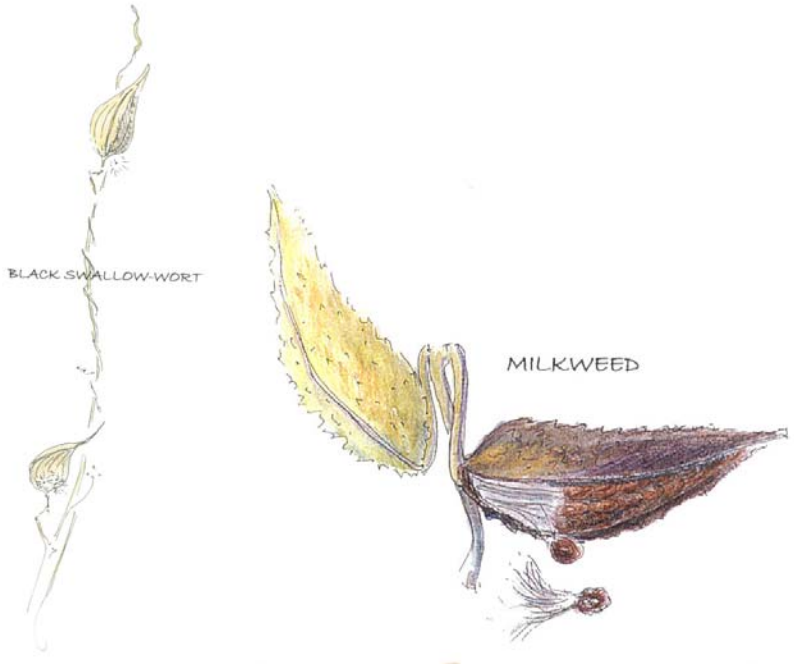
Recommendations for Management

Regular management is necessary to maintain the diversity of habitat types found at Bussey Brook Meadow. The grasslands at the site are mowed annually, and this management should continue. The mowing should take place in the fall after the native grasses have set seed and ground-nesting birds have fledged. Mowing without removing the hay will encourage small mammals, leave seeds for over wintering birds, and encourage butterflies. Mowing once a year will keep the field predominantly grass, and prevent shrubs and vines, such as the invasive Asiatic bittersweet, from getting a foothold. Any intended trails should be mowed more regularly.

Figure 4. Mowing Proposal for Bussey Brook Meadow, showing existing and proposed trail system. Courtesy of Arboretum Park Conservancy.

The structure of the current and proposed trail system at Bussey Brook, as shown in Figure 4, is appropriate for the site. The Blackwell Footpath utilizes much of the old road bed, which connects the Forest Hills T-Stop on Washington Street to the South Street gate of the Arnold Arboretum, and a mowed path continues to the southern narrow strip of the property across the street from Peter Hill. A few additional small loop trails or short interpreted side trails would be valuable in areas, such as through the more native grassland south of Bussey Brook, to the base of the slope where the Oak-Hickory Forest is located, and into the ravine.

For the foreseeable future, weedy species will dominate portions of the property, including the Mesa and the field north of Bussey Brook. In such areas, no action should be undertaken to remove nonnative species, as many are highly invasive and are found throughout the property and surrounding lands. Eradication would be an enormous undertaking and is unlikely to be successful. There are portions of the property that remain relatively free of invasives, including the Oak-Hickory Forest area and parts of the field south of Bussey Brook where little bluestem dominates. These areas should be monitored for further encroachment of invasive species, and should be the focus of any invasive removal performed at the site. Removal of black swallowwort from the field south of Bussey Brook is of high priority.



Recommendations for Education and Interpretation

Bussey Brook Meadow has the potential to be used widely for educational purposes. It is located in the city of Boston and is easily accessible via public transportation, making it an excellent site for environmental education. The different habitat types and species diversity offer infinite opportunities for interpretation in this urban wild. We suggest a few ideas for themes and sites for interpretation, and these are intended as a "jumping-off" point; they are by no means comprehensive. Invasive species, habitat types, native grasslands and succession in New England, seed dispersal, and pollination are examples of themes that could be addressed at the site. These are discussed in greater detail below.

A. Invasive Species

Bussey Brook Meadow is an excellent site for education on invasive plant species and the threats they pose to ecosystems in New England. We observed a total of 33 invasive species at Bussey Brook Meadow, and in some areas these aggressive plants are visibly dominant, forming dense monocultural stands. Some general education on the overall problem of invasive species should be included. There are also numerous sites where specific aspects of this issue can be addressed. The stands of common reed and purple loosestrife along Bussey Brook offer the opportunity to discuss the thousands of acres of wetland habitat being devastated by these two aggressive invasive species. In the cultural grassland south of Bussey Brook, black swallowwort and common milkweed grow side by side, making it a good site to address the impacts invasive plants can have on insects and other animals. Monarch butterflies, whose larva depend on milkweed as a food source, sometimes mistakenly lay their eggs on swallowwort, which is in the same plant family as common milkweed, but is not a viable food source for the caterpillars.

B. Habitats

There are five different natural communities at Bussey Brook Meadow, and several of them are particularly well suited to interpretation. The field south of Bussey Brook, which has many native species such as little blue stem and goldenrods, is a good site to discuss grassland habitats and their importance to birds and insects. Loss of grasslands in New England due to natural succession and invasive species can be addressed here, as shrubs are beginning to take over the site. Wetland habitats can be interpreted along Bussey Brook, including species found in these habitats and the important functions of wetlands, such as absorbing and filtering water. The base of the slope south of South Street, where the oak-hickory forest occurs, offers a location to discuss forest habitats and their associated plant and animal species. The ravine is a striking feature worth including as an interpretation area, and would be an appropriate place to discuss the land use history of Bussey Brook Meadow.

C. **Processes in Nature**

Environmental interpretation at Bussey Brook Meadow could also include information on processes in nature, such as seed dispersal and pollination. The plant species at the site exemplify different mechanisms of seed dispersal that can be fun to explore. For example, jewelweed, common milkweed, and blueberry use explosive, wind, and animal dispersal techniques respectively. Pollinators, including honey bees, native bees, flies, and beetles, can be easily observed at the site, particularly in the fall on asters and goldenrods in the fields. Interpretation here may focus on the importance of pollinators in wild, as well as agricultural, plant species.

Overall, we recommend maintaining Bussey Brook as an urban wild with the low-impact activities currently allowed on the site, and utilizing the site for educational opportunities. Few urban wilds exist in Boston with the habitat diversity found at Bussey Brook. The site's accessibility via public transportation makes it an excellent area for interpretation, through research projects, school field trips, and nature walks for the public.

ACKNOWLEDGMENTS

We would like to acknowledge the Plant Conservation Volunteer Corps of the New England Wild Flower Society, who volunteered their time and botanical knowledge to make this report possible. Specifically, we would like to thank the following PCVs who took part in this botanical inventory: Mary Lee Everett, Betty Wright, Nancy Free, Irina Kadis, Deb Olstein, Jenny Smith, and Cheryl Lowe. Thanks must also be extended to our two 2005 Conservation Fellows, who conducted field surveys and entered much of the data: Danielle Dyer and Joy VanDervort-Sneed. We would also like to thank the Boston Natural Areas Network, for providing us with reports, maps, and results from previous botanical work done at the site.

Anne Schmalz, Arboretum Park Conservancy Director, donated her beautiful watercolors of species she observed in the Bussey Brook Meadow.

Nina Brown, Arboretum Park Conservancy Director, contributed her watercolor of the sensitive fern.

Andrea d'Amato, Arboretum Park Conservancy, contributed the cover photograph.

Jessie Crowley, Brown Richardson & Rowe, Inc., Landscape Architects and Planners, designed the placement of the water colors in the report.

We would like to thank the Arnold Arboretum Committee for funding this project. This organization of friends and neighbors of the Arnold Arboretum was founded in 1982 to preserve and promote the resources of the Arnold Arboretum.

References and Resources

Audet, R. September 2005. A hitchhiker;s guide to the invasive plant universe. *Science Scope*. Available at www.nsta.org

Brown, Richardson & Rowe, Inc. 2002. Bussey Brook Meadow at the Arnold Aboretum: Draft Stewardship Plan.

Crow, G.E. and C.B. Hellquist. 2000. *Aquatic and Wetland Plants of Northeastern North America*. The University of Wisconsin Press. Madison, WI.

Gleason, H.A. and A. Cronquist. 1991. *Manual of Vascular Plants of Northeastern United States and Adjacent Canada*. Second Edition. The New York Botanical Garden. Bronx, NY.

Haines, A. 26 September 2005. *Flora Novae Angliae*. Available at http://www.arthurhaines.com/flora_novae_angliae.htm

Haines, A. and T. Vining. 1998. *Flora of Maine, a Manual for Identification of Native and Naturalized Vascular Plants of Maine*. V. F. Thomas Co. Bar Harbor, ME.

Massachusetts Invasives Plant Advisory Group. April 1, 2005. *Final Report: An Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts, with annotated list.* Available at http://www.newfs.org/conserve/docs/MIPAG040105.pdf.

Massachusetts Invasive Plant Advisory Group. February 28, 2005. *Strategic Recommendations for Managing Invasive Plants in Massachusetts.* Available at http://www.newfs.org/conserve/docs/MIPAGstrat1.pdf

Nature Conservancy, The. 2005. The Global Invasive Species Invasive. http://tncweeds.ucdavis.edu

Newcomb, L. 1977. *Newcomb's Wildflower Guide*. Little, Brown and Company. Boston, MA.

Palmer, E.J. 1930. The Spontaneous Flora of the Arnold Arboretum. *Journal of the Arnold Arboretum*. Volume 11, Number 2. Pages 62-119.

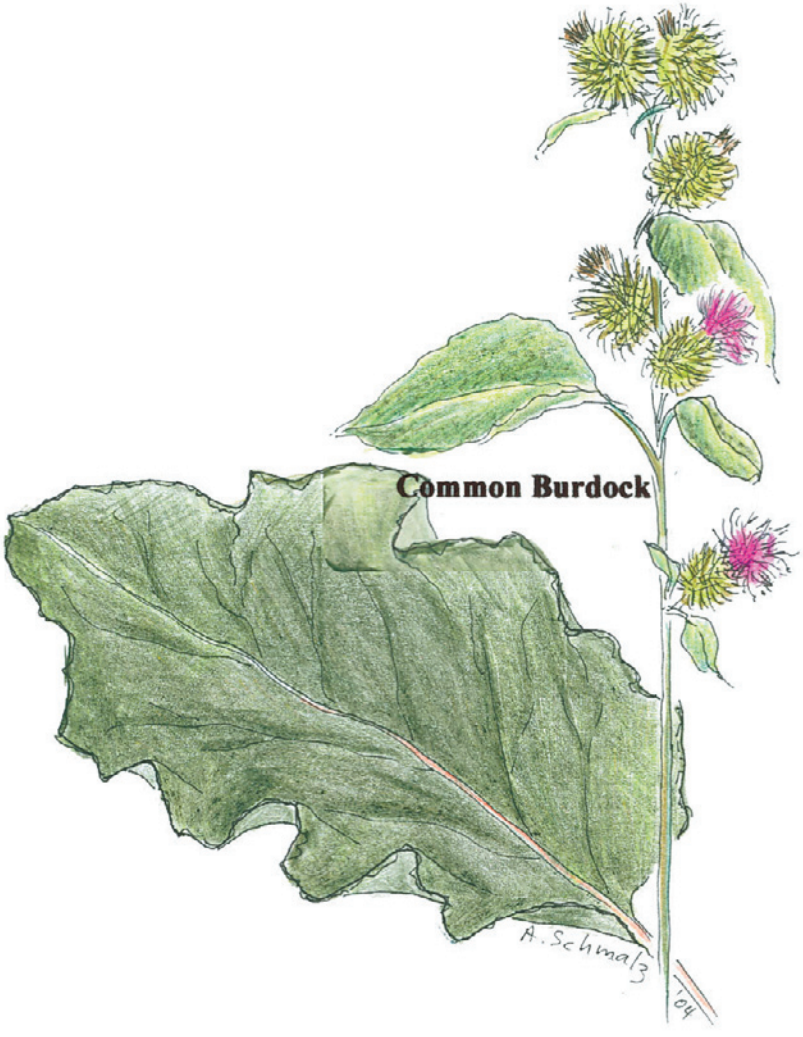
Swain, P.C. and J. B. Kearsley. 2001. DRAFT. *Classification of the Natural Communities of Massachusetts*. Natural Heritage and Endangered Species Program, Massachusetts Division of Fisheries and Wildlife. Westborough, MA. Available at http://www.mass.gov/dfwele/dfw/nhesp/nhclass.htm

FORBS


Black Knapweed


YARROW


GARLIC MUSTARD


Common Burdock
A. Schmalz
'04

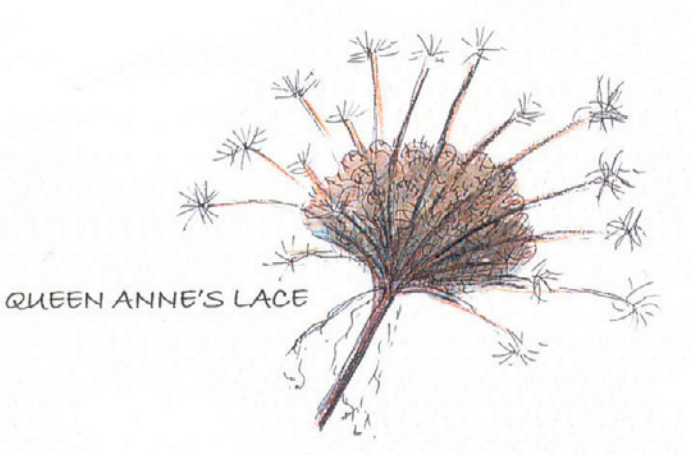

Brown Knapweed

Appendix 1. Species list for Bussey Brook Meadow.

Species observed during the Bussey Brook Meadow botanical surveys.
*=non-native invasive species ^=non-native species

Scientific Name	Common Name	Natural Community
FORBS		
Acalypha rhomboidea	rhombic copperleaf, three-seeded Mercury	field
Achillea millefolium^	Yarrow	field
Ageratina altissima	white snakeroot	forested slope
Alisma sp	water plantain	wetland
*Alliaria petiolata**	garlic mustard	field, forested slope, mesa
Allium canadense	wild garlic	field
Allium vineale^	field garlic	field
Ambrosia artemisiifolia	common ragweed	field, mesa
Anemone quinquefolia	wood anemone	mixed hardwood forest
Apocynum androsaemifolium	spreading dogbane	field
Arabidopsis thaliana	mouse-ear cress	field
Arctium lappa^	great burdock	field, mesa
Arctium minus^	common burdock	field, mesa
Artemisia vulgaris^	common mugwort	field, mesa
Asclepias syriaca	Milkweed	field
Barbarea vulgaris^	winter crest	field
Bidens cernua	nodding beggar ticks, bur-marigold	wetland
Bidens connata	swamp beggars ticks	wetland
Bidens frondosa	devil's beggar ticks	mesa, wetland
Brassica nigra^	black mustard	field
Calystegia sepium	hedge bindweed	field
Capsella bursa-pastoris^	shepherd's purse	field
Cardamine parviflora	small-flowered bitter cress	field
Cardamine pensylvanica	pennsylvania bitter cress	wetland
Centaurea jacea	brown knapweed	field
Centaurea nigra^	black knapweed	field
Chelidonium majus^	Celandine	field
Chelone glabra	white turtlehead	wetland
Chenopodium album^	pigweed, lambs quarters	mesa
Chrysanthemum leucanthemum^	ox-eye daisy	field
Cichorium intybus^	common chicory	field
Cicuta maculata	spotted cowbane, water hemlock	wetland
Circaea quadrisulcata	enchanter's nightshade	forested slope, mesa, wetland
Cirsium arvense^	Canada thistle	field
Cirsium vulgare^	bull thistle	field
Commelina communis^	Asiatic dayflower	mesa
Convallaria majalis^	lily of the valley	mesa
Convolvulus arvensis^	field bindweed	field

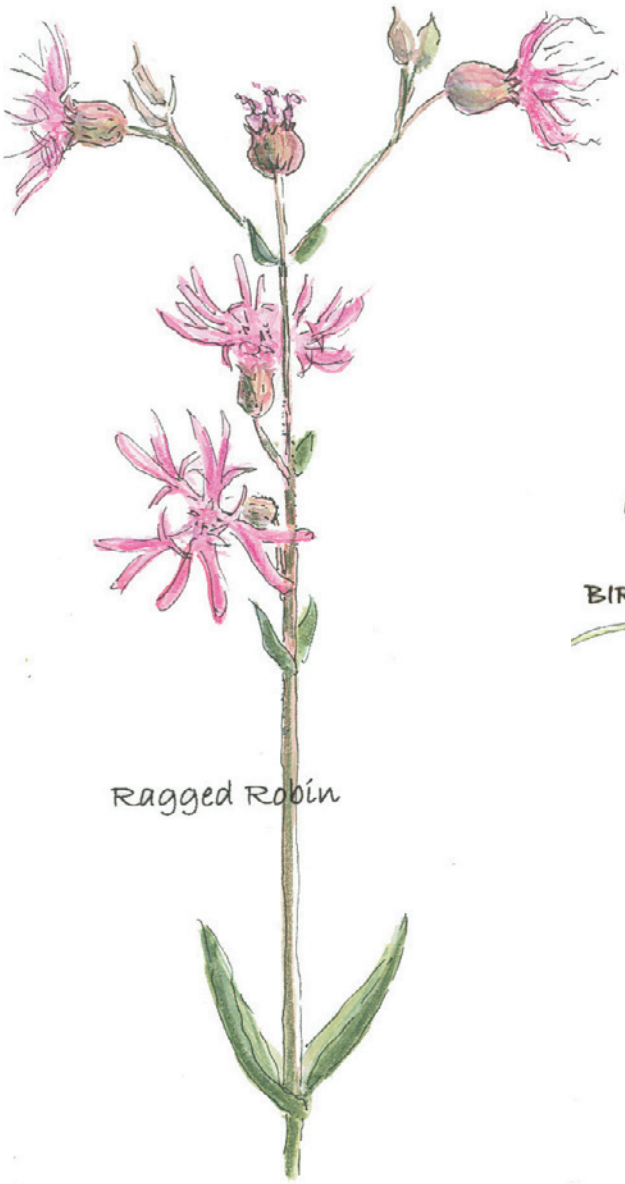
FORBS

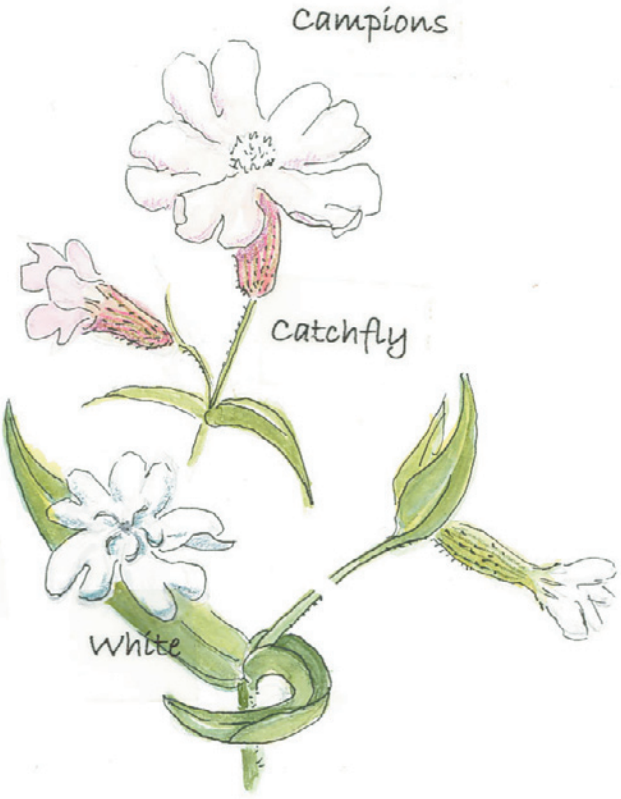


Species observed during the Bussey Brook Meadow botanical surveys.
*=non-native invasive species ^=non-native species

Cuscuta compacta	compact dodder	field
*Cynanchum louiseae**	black swallowwort	field, mesa
Daucus carota^	Queen Anne's lace	field, mesa
Desmodium sp.^	tick-trefoil	field
Dianthus armeria^	Deptford pink	field, mesa
Epipactis helleborine^	Hellebore	field, mixed hardwood forest
Erigeron annuus	daisy fleabane	mesa
Erigeron canadensis	Horseweed	field
Eupatorium perfoliatum	Boneset	wetland
Eupatorium serotinum	late-flowering boneset	wetland
Eurybia divericata	white wood aster	forested slope, mixed hdwd frst
Euthamia graminifolia	lance-leaved goldenrod	mesa
Eutrochium dubium	three-nerved joe-pye weed	mesa, wetland
Eutrochium maculatum	spotted joe-pye weed	wetland
Fallopia convolvulus^	black-bindweed	field
Fallopia cristata	climbing false buckwheat	field
*Fallopia japonica**	Japanese knotweed	field, mesa
Fragaria virginiana	wild strawberry	field
Galeopsis tetrahit^	hemp nettle	mesa
Galium aparine	Cleavers	field
Galium mollugo^	wild madder	field
Galium trifidum	northern three-lobed bedstraw	wetland
Geranium maculatum	wild geranium	mixed hardwood forest
Geum rivale	water avens	wetland
*Glechoma hederacea**	ground ivy	mesa
Gnaphalium uliginosum	marsh cudweed	wetland
Helianthus tuberosus	Jerusalem artichoke	field, mesa, wetland
Hemerocallis fulva^	orange day-lily	field, mesa
*Hesperis matronalis**	dame's rocket	field
Hieracium canadense	Canada hawkweed	field, forested slope
Hieracium flagellare^	whiplash hawkweed or large mouse ear	field
Hieracium lachenalii^	common hawkweed	field
Hypericum perforatum^	common St. Johnswort	field
Hypericum punctatum	spotted St. Johnswort	field
Hypochoeris radicata^	spotted cat's-ear	field
Impatiens capensis	jewelweed, touch-me-not	wetland
*Iris pseudacorus**	yellow flag iris	wetland
Lactuca biennis	tall blue lettuce	mes
Lactuca scariola ^	prickly lettuce	mesa
Lamium cf *purpureum* ^	purple dead nettle	field
Lapsana communis	Nipplewort	field
Lathyrus pratensis^	yellow vetchling	field

FORBS





Iris pseudacorus
Yellow Iris
(in the wetland beyond)

Species observed during the Bussey Brook Meadow botanical surveys.

*=non-native invasive species ^=non-native species

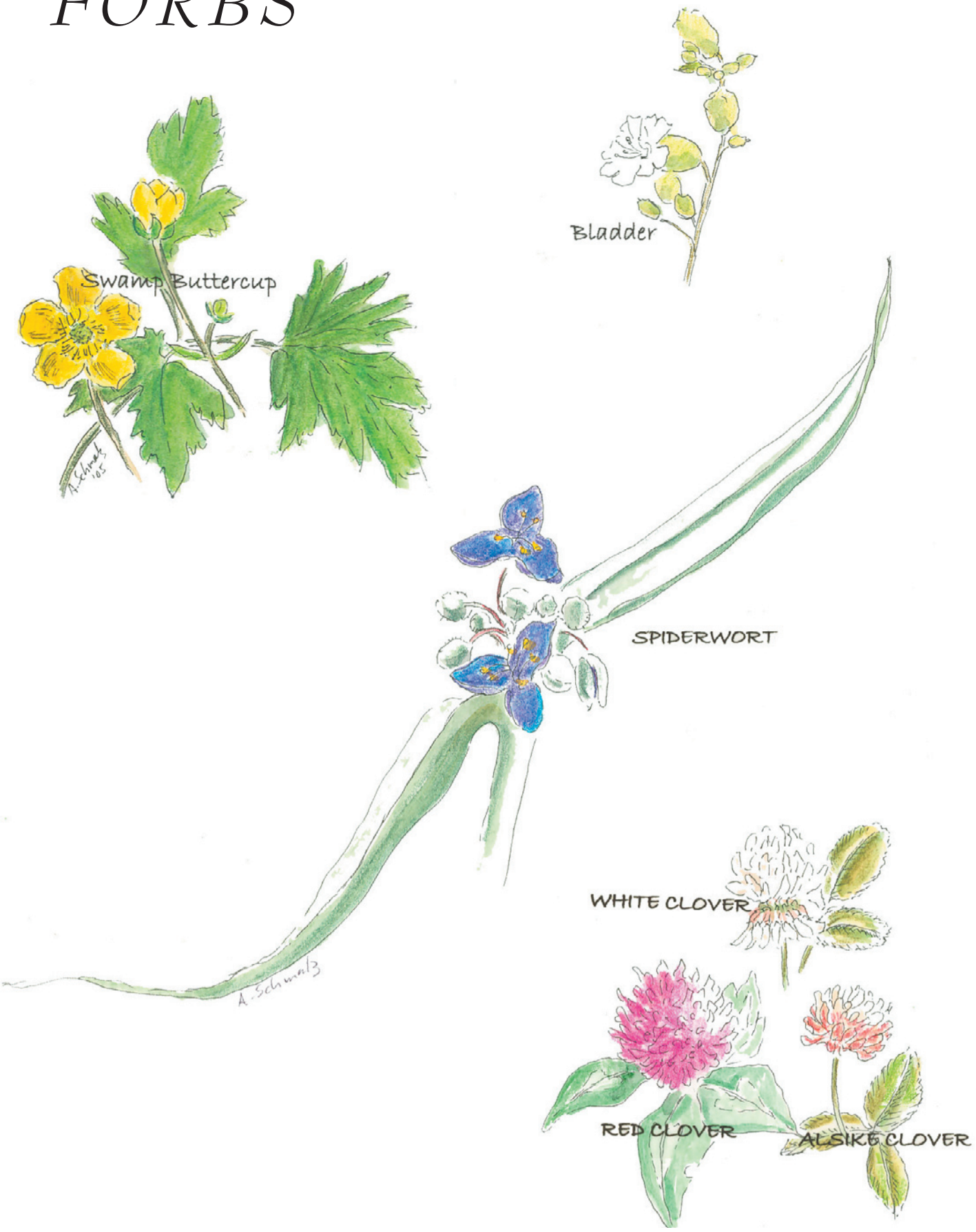
Lemna minor	Duckweed	wetland
Leonurus sibericus^	Siberian motherwort	mesa
Lepidium campestre^	field peppergrass	field
Linaria vulgaris^	butter-and-eggs	field
Lotus corniculatus^	birdsfoot trefoil	field
Ludwigia palustris	common water purslane	wetland
Lychnis alba^	white campion	field
Lychnis flos-cuculi^	ragged robin	field
Lycopus americanus	water horehound	wetland
*Lythrum salicaria**	purple loosestrife	wetland
Maianthemum canadense	Canada mayflower	mixed hardwood forest
Medicago lupulina^	black medick	field
Melilotus alba^	white sweet clover	mesa
Mentha piperita^	Peppermint	field
Maianthemum racemosum	false Solomon's seal	mixed hardwood forest
Mollugo verticillata^	Carpetweed	field, forested slope
Monotropa uniflora	Indian pipe	mixed hardwood forest
Oenothera biennis^	common evening primrose	field, mesa
Oxalis stricta^	yellow wood sorrel	field, mesa, wetland
Persicaria maculosa^	lady's thumb	wetland, mesa
Phytolacca americana^	Pokeweed	mesa, field
Pilea pumila	Clearweed	wetland
Plantago lanceolata^	English plantain	field, mesa
Plantago major^	common plantain	field, mesa
Polygonatum pubescens	hairy Solomon's seal	mixed hardwood forest
Polygonum lapathifolium	dock-leaved smartweed	field, wetland
Portulaca oleracea^	Purslane	field
Potentilla argentea^	silvery cinquefoil	field
Potentilla canadensis	dwarf cinquefoil	field
Potentilla recta^	sulphur cinquefoil	field
Potentilla simplex	common cinquefoil	field
Rannunculus bulbosa	bulbous buttercup	field
*Rannunculus ficaria**	lesser celandine	wetland
*Rannunculus repens**	creeping buttercup	wetland
Ranunculus acris^	tall buttercup	field
Ranunculus caricetorum	swamp buttercup	wetland
Rorippa palustris	common yellow-cress	wetland
Rumex acetosella^	sheep sorrel	field
Rumex crispus^	curly dock	mesa
Rumex obtusifolius^	broad-leaved dock	field, mesa
Sagittaria latifolia	common arrowhead	wetland
Senecio sp.	Ragwort	mesa

Species observed during the Bussey Brook Meadow botanical surveys.

*=non-native invasive species ^=non-native species

Sedum sp.	Sedum	field
Silene vulgaris^	bladder campion	field
Sinapis arvensis^	charlock	field
Smilax herbacea	Carrion flower	field
Solanum dulcamara^	bittersweet nightshade	field, wetland
Solidago altissima	tall goldenrod	field
Solidago bicolor	silverrod, white goldenrod	forested slope
Solidago caesia	blue-stemmed goldenrod	mixed hardwood forest
Solidago canadensis	Canada goldenrod	field
Solidago gigantea	late or smooth goldenrod	field, mixed hardwood forest
Solidago juncea	early goldenrod	field
Solidago nemoralis	gray goldenrod	field, forested slope
Solidago rugosa	rough-stemmed goldenrod	field, mesa
Sonchus arvensis^	field sow thistle	field, mesa
Sonchus asper^	spiny-leaved sow thistle	Field
Spergula morisonii^	European spurrey	Foe;d
Stellaria graminea^	lesser stitchwort	field
Stellaria vulgatum^	Mouse-eared chickweed	field
Symphyotrichum cordifolium	common blue heart-leaved aster	field, forested slope
Symphyotrichum ericoides	squarrose white aster	field
Symphyotrichum lanceolatum	Eastern lined aster	field
Symphyotrichum lateriflorum	calico aster	field, forested slope
Symphyotrichum novae-angliae	New England aster	field
Symphyotrichum parviceps	small-head aster	field
Symphyotrichum patens	late purple aster	field
Symphyotrichum puniceum	Purple-stem aster	field
Symphyotrichum racemosum	small-headed aster	field
Symphytum officinale^	comfrey	wetland
Symplocarpus foetidus	Skunk cabbage	wetland
Tanacetum vulgari^	Tansy	field, wetland, mesa
Thlaspi arvense^	field penny cress	field
Tradescantia sp	spiderwort hybrid	mesa
Tragopogon pratensis^	goat's-beard	forested slope
Trifolium agrarium^	hop-clover	field
Trifolium arvense^	rabbit's-foot clover	field
Trifolium pretense^	red clover	field
Trifolium procumbens^	low hop clover	field
Trifolium repens^	white clover	field, mesa
Tulipa sylvestris^	Tulip	field
Urtica dioica^	stinging nettle	wetland
Uvularia sessilifolia	wild oats	mixed hardwood forest
Verbascum thapsus^	common mullein	field

FORBS

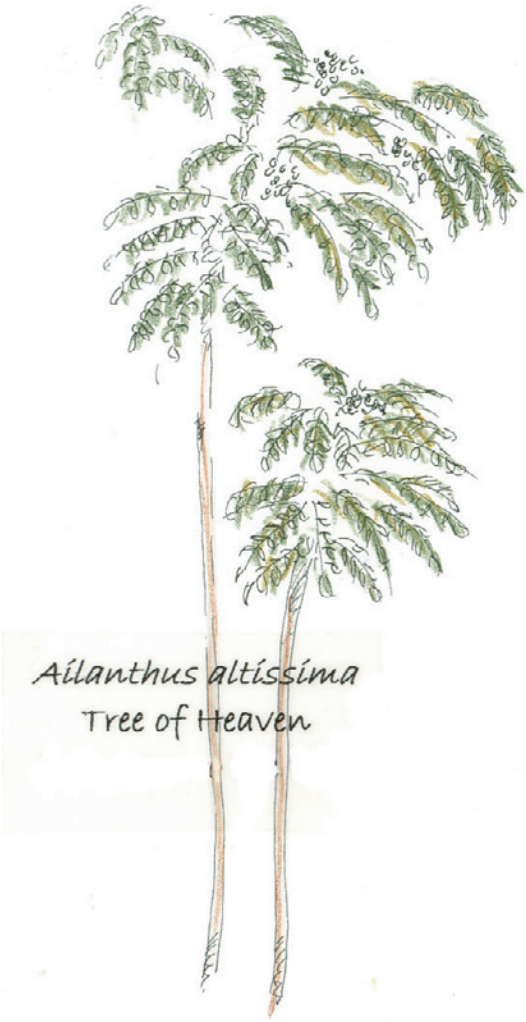

Bladder
Swamp Buttercup
SPIDERWORT
WHITE CLOVER
RED CLOVER
ALSIKE CLOVER

Species observed during the Bussey Brook Meadow botanical surveys.

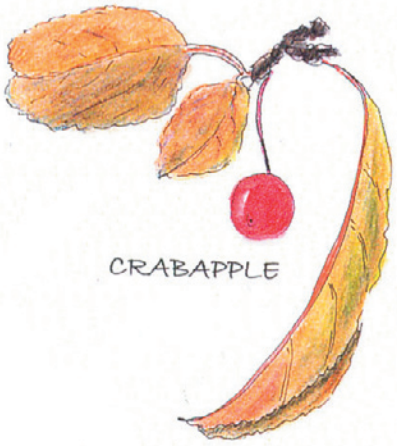
*=non-native invasive species ^=non-native species

Verbena urticifolia	white vervain	mesa
Veronica officinalis^	common speedwell	field, forested slope
Veronica peregrina	purslane speedwell	field
Vicia cracca^	cow vetch	field
Vicia tetrasperma^	slender vetch	field
Viola spp	Violet	field

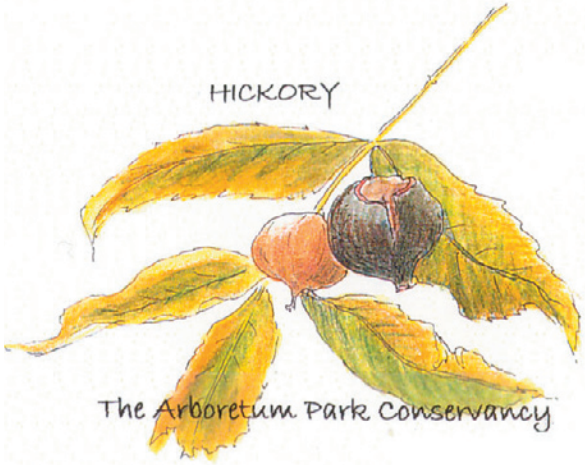
TREES



Ailanthus altissima
Tree of Heaven



CRABAPPLE



HICKORY

The Arboretum Park Conservancy

LOCUST (a scavenger has gotten the seeds!)

A. Schmalz '04

Species observed during the Bussey Brook Meadow botanical surveys.
*=non-native invasive species ^=non-native species

TREES

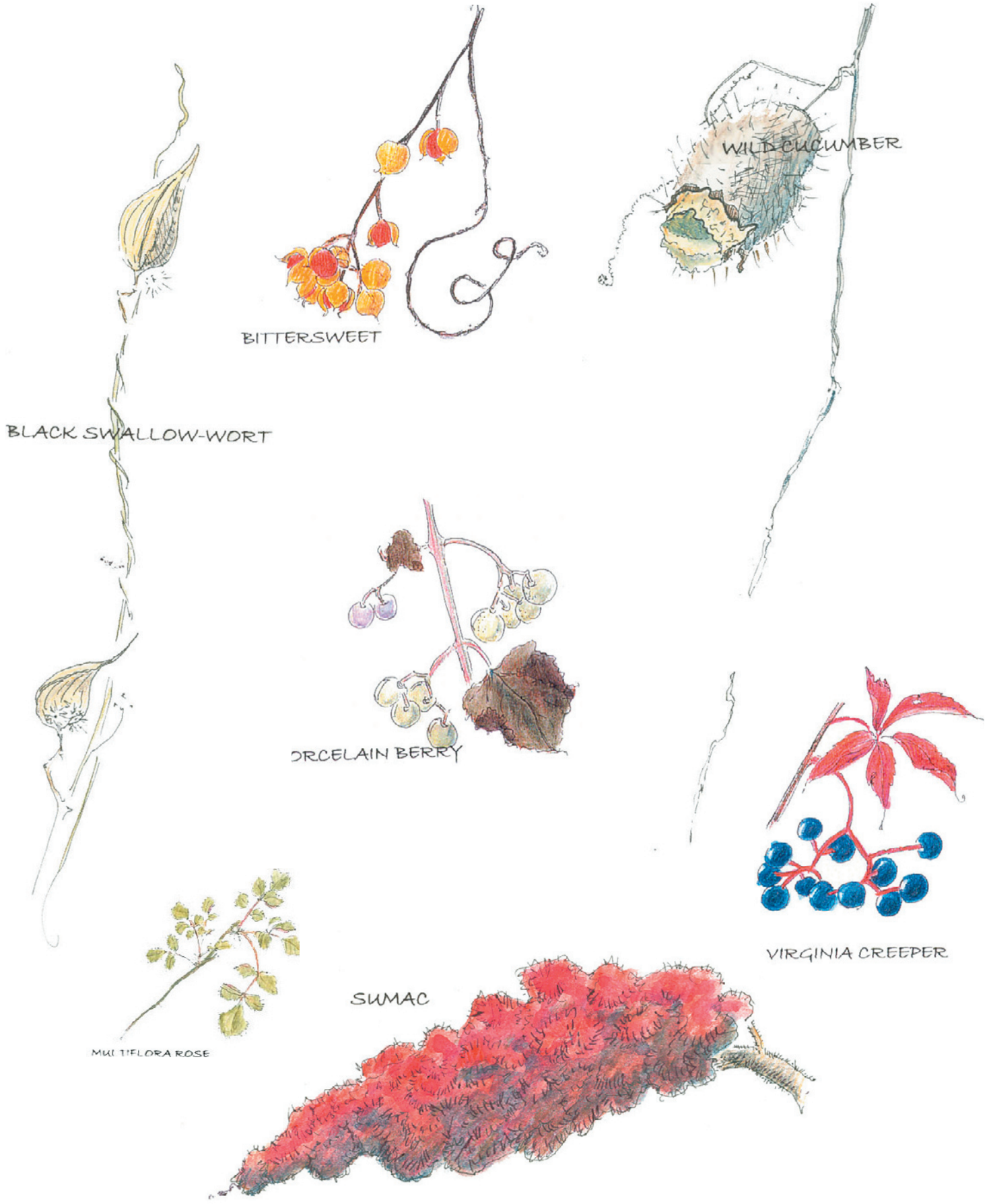
Abies sp.	Fir	mesa
Acer ginala^	Siberian maple	mesa
Acer negundo	box-elder	mesa
*Acer platanoides**	Norway maple	forested slope, mixed hdwd frst
Acer rubrum	red maple	mixed hardwood forest
Acer saccharinum	silver maple	wetland
Aesculus hippocastanum^	horse chestnut	field, wetland
*Ailanthus altissima**	tree of heaven	forested slope, mixed hdwd frst
Alnus glutinosa^	black alder	field
Alnus incana	speckled alder	field, wetland
Betula lenta	sweet birch	mixed hardwood forest
Betula nigra	river birch	field
Betula papyrifera	paper birch	field
Betula populifolia	gray birch	forested slope
Carya ovata	shagbark hickory	forested slope, mixed hrdwd frst
Catalpa speciosa	northern catalpa	mesa
Cercidiphyllum japonicum^	katsura tree	mesa
Cornus amomum	silky dogwood	wetland
Cornus racemosa	panicled dogwood	field
Crataegus sp.	hawthorn	frstd slope, mesa, mxd hrdwd frst
*Eleagnus umbellata**	autumn olive	field
Fagus grandifolia	American beech	mixed hardwood forest
Fagus sylvatica 'purpurea'^	copper beech	mesa
*Frangula alnus**	glossy buckthorn	wetland, mixed hardwood forest
Fraxinus americana	white ash	mesa
Fraxinus chinensis^	Chinese ash	mesa
Gleditsia triacanthos	honey-locust	mesa
Halesia carolina^	Carolina silverbell	mixed hardwood forest
Juglans nigra	black walnut	field
Malus sp.^	crab apple	wetland, forested slope
Morus alba^	white mulberry	mesa
Ostrya japonica^	Japanese hornbeam	mesa
*Paulownia tomentosa**	princess tree	mesa
*Phellodendron amurense**	Amur cork tree	mesa, mixed hardwood forest
Philadelphus inodorus^	mock-orange	mesa
Picea spp	spruce	mesa
Pinus nigra^	Austrian pine	field
Pinus strobus	eastern white pine	mixed hardwood forest
Populus alba^	white poplar	field, mesa
Populus deltoides	cottonwood	field
Populus souveolens^	German poplar	field

Species observed during the Bussey Brook Meadow botanical surveys.

*=non-native invasive species ^=non-native species

Populus tremuloides	quaking aspen	field, mesa
Prunus serotina	black cherry	field, mixed hardwood forest
Prunus virginiana	choke cherry	field
Pyrus ussuriensis^	Siberian wild pear	mesa, mixed hardwood forest
Quercus alba	white oak	mixed hardwood forest
Quercus coccinea	scarlet oak	mixed hardwood forest
Quercus rubra	red oak	mixed hardwood forest
Quercus velutina	black oak	forested slope, mixed hdwd frst
*Rhamnus cathartica**	common buckthorn	mixed hardwood forest
*Robinia pseudoacacia**	black locust	field, mesa
Salix x *pendulina*^	weeping willow	wetland
Sorbus alnifolia^	Korean mountain-ash	mesa, mixed hardwood forest
Sorbus aucuparia^	European mountain-ash	mixed hardwood forest
Taxus sp.	yew	mixed hardwood forest
Tilia americana	American basswood	mixed hardwood forest
Tsuga canadensis	eastern hemlock	mixed hardwood forest
Ulmus americana	American elm	forested slope, mesa
Ulmus procera^	English elm	mesa

SHRUBS AND VINES



Species observed during the Bussey Brook Meadow botanical surveys.
*=non-native invasive species ^=non-native species

SHRUBS

Amelanchier sp.	shadbush	mixed hardwood forest
*Berberis thunbergii**	Japanese barberry	mixed hardwood forest
*Berberis vulgaris**	common barberry	mixed hardwood forest
Celtis occidentalis	American hackberry	mixed hardwood forest
Cuscuta gronovii	common dodder	field
*Euonymus alatus**	burning bush	field, forested slope
Euonymus europaeus^	European spindle-tree	field, forested slope,
*Fallopia convolvulus**	black bindweed	field
Humulus lupulus	common hop	mesa
Kalmia latifolia	sheep laurel	mixed hardwood forest
Kalopanax pictus^	castor-leaved aralia	mesa, mixed hardwood forest
Ligustrum sp.^	privit	wetland
Rhus typhina	stag horn sumac	field, mesa
Rhus glabra	smooth sumac	field
Ribes sp.	gooseberry	mixed hardwood forest
Rosa blanda	smooth rose	field
Rosa carolina	pasture rose	field
*Rosa multiflora**	multiflora rose	field, mesa
Rosa rugosa^	rugosa rose	field
Rubus allegheniensis	blackberry	mixed hardwood forest
Rubus flagellaris	northern dewberry	field
Rubus hispidus	swamp-dewberry	field
Rubus idaeus	red raspberry	field
Rubus occidentalis	black raspberry	field
Salix discolor	pussy willow	wetland
Sambucus canadensis	common elder	wetland
Vaccinium angustifolium	low-bush blueberry	mixed hardwood forest
Vaccinium corymbosum	high-bush blueberry	mixed hardwood forest
Viburnum acerifolium	maple-leaved viburnum	mixed hardwood forest
Viburnum dentatum var. *lucidum*	arrow-wood	mixed hardwood forest
Vitis labrusca	fox grape	field, frstd slope, mxd hdwd frst
Vitis riparia	river bank grape	mesa, mixed hdwd forest

Species observed during the Bussey Brook Meadow botanical surveys.
*=non-native invasive species ^=non-native species

VINES

*Ampelopsis brevipedunculata**	porcelain berry	field, forested slope, mesa
*Celastrus orbiculatus**	Asiatic bittersweet	field, forested slope, mesa
*Cynanchum louiseae**	black swallowort	field
Echinocystis lobata	wild cucumber	mesa, wetland
*Hedera helix^*	English ivy	mesa
*Lonicera mackii**	Amur honeysuckle	field
*Lonicera morrowii**	Morrow's honeysuckle	field
*Lonicera tatarica**	Tartarian honeysuckle	field
*Lonicera x bella**	Belle's honeysuckle	field
Parthenocissus quinquefolia	Virginia creeper	field, mixed hardwood forest
Toxicodendron radicans	poison ivy	forested slope

Species observed during the Bussey Brook Meadow botanical surveys.
*=non-native invasive species ^=non-native species

GRAMINOIDS

Agrostis gigantean^	black bentgrass	field
Alopercurus pratensis^	meadow foxtail	field
Anthoxanthum odoratum^	sweet vernal grass	field
Arrhenatherium elatius^	tall oat grass	field
Bromus commutatus^	brome grass, hairy chess	field
Carex argyrantha	silvery sedge	mixed hardwood forest
Carex blanda	woodland sedge	mixed hardwood forest
Carex cephalophora	oval-headed sedge	mixed hardwood forest
Carex crinita	fringed or drooping sedge	wetland
Carex pallescens	pale sedge	field, wetland
Carex pensylvanica	Pennsylvania sedge	mixed hardwood forest
Carex stipata	awl-fruited or greater straw sedge	wetland
Carex swanii	squarose sedge	field
Carex vulpinoidea	fox sedge	field, mesa
Cinna arundinacea	common wood reedgrass	mixed hardwood forest
Cyperus esculentus	yellow nutsedge	field
Cyperus strigosus	false nutsedge	field
Dactylis glomerata^	orchard-grass	field
Deschampsia flexuosa	common hairgrass	field
Echinocloa crus-galli^	barnyard-grass	field
Elymus repens^	witch grass, quack grass	field
*Festuca filiformis**	fine-leaved sheep fescue	field
Festuca rubra^	red fescue	field
Festuca trachyphylla^	hard fescue	field
Holcus lanatus^	velvet grass	field
Juncus effuses	soft rush	field
Juncus secundus	lopsided rush	field, wetland
Juncus tenuis	path rush	field
Lolium perenne^	ryegrass	field
Luzula multiflora	common woodrush	mixed hardwood forest
*Phalaris arundinacea**	reed canary grass	wetland
Phleum pretense^	timothy grass	field
*Phragmites australis**	common reed	wetland
Poa annua^	spear grass	field
*Poa compressa**	Canada bluegrass	field
Poa palustris	fowl meadow grass	field
Poa pratensis^	Kentucky bluegrass	field
Rhynchospora sp.	beak-rush	wetland
Schizachyrium scoparium	little bluestem	field
Scirpus atrovirens	dark green bulrush	field, wetland

Species observed during the Bussey Brook Meadow botanical surveys.

*=non-native invasive species ^=non-native species

Setaria sp.	foxtail-grass	field
Sparganium eurycarpum	branching bur-reed	wetland
Typha latifolia	common cattail	wetland

Species observed during the Bussey Brook Meadow botanical surveys.
*=non-native invasive species ^=non-native species

FERNS AND FERN ALLIES

Athyrium filix-femina	lady fern	forested slope
Dennstaedtia punctilobula	hay-scented fern	field
Dryopteris carthusiana	toothed wood-fern	forested slope
Dryopteris intermedia	fancy wood-fern	forested slope
Equisetum arvense	common horsetail	forested slope
Onoclea sensibilis	sensitive fern	field
Thelypteris noveboracensis	New York fern	forested slope

Appendix 2. Glossary

Ferns: flowerless and seedless vascular plants that reproduce by spore, have true roots from a rhizome, and fronds that uncurl upward.

Fern allies: All spore-bearing vascular plants that do not otherwise meet the definition of a fern. Example: horsetails.

Forbs: broad-leaved, non-grass-like herbaceous seed plants.

Graminoids: grasses or grass-like seed plants. Example: sedges.

Herbs or **herbaceous plants:** vascular plants without significant woody tissue. This includes annuals, biennials, and perennial plants that lack significant thickening by secondary growth.

Invasive species: non-native species that invade and alter both natural and managed areas. For this document, plants are considered invasive if listed as "invasive," "likely invasive," or "potentially invasive" in *An Evaluation of Non-Native Plant Species for Invasiveness in Massachusetts, with annotated list* (Massachusetts Invasives Plant Advisory Group, 2005).

Native species: those species that occurred in the United States before Europeans arrived.

Natural community: a group of species that recur together without human intervention. These species interact with one another, form a functional unit, and are fairly consistent from one site to another.

Non-native species: those species that began occurring in the United States after Europeans arrived.

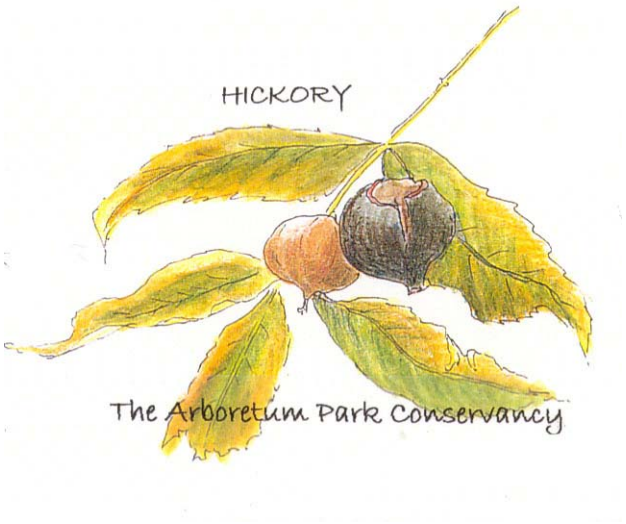
Shrubs: perennial woody species that are generally less than 4 to 5 meters in height. Typically, shrubs are multi-stemmed.

Trees: perennial, woody species that are normally greater than 4 to 5 meters in height. Typically, trees are single-stemmed.

Vascular plants: plants with water and fluid conductive tissue (xylem and phloem). This includes seed plants, ferns, and fern allies.

Appendix 3. Swain and Kearsley (2001) natural community descriptions.

Descriptions are included for Cultural Grassland, Black Oak-Scarlet Oak Forest, Oak-Hickory Forest, Deep Emergent Marsh, and Mud Flat. These descriptions are excerpted from *Classification of the Natural Communities of Massachusetts* (Swain and Kearsley, 2001). Please keep in mind that the descriptions from Swain and Kearsley (2001) do not apply specifically to the site at Bussey Brook Meadow, but are intended as a reference for information about the types of natural communities found at the site. Please refer to Figure 3 for the location of the natural communities at Bussey Brook Meadow.



PAGE GUIDE

Community Name: Name used to describe the community in Massachusetts

Community ELCODE: Unique ten digit alphanumeric element code (ELCODE) assigned to the community.

SRANK: Community state rank (SRANK) that reflects the community's rarity and threat within Massachusetts, with regard to its regional rarity and threat. The SRank system was developed for Natural Heritage programs by The Nature Conservancy. The SRANKs are as follows:

- **S1**= Typically 5 or fewer occurrences, very few remaining acres or miles of stream, or especially vulnerable to extirpation in Massachusetts for other reasons.
- **S2=** Typically 6-20 occurrences, few remaining acres or miles of stream, or very vulnerable to extirpation in Massachusetts for other reasons.
- **S3=** Typically 21-100 occurrences, limited acreage or miles of stream in Massachusetts.
- **S4=** Apparently secure in Massachusetts.
- **S5=** Demonstrably secure in Massachusetts.
- **SU=** Status unknown in Massachusetts.

Tracked: Yes/No field. Yes means that the community is tracked in NHESP's database. NHESP tracks examples of communities that are ranked S1-S3. Communities that are ranked S4 or S5 generally are not tracked, except for exemplary occurrences. Some newly defined S3 communities (draft) are not yet tracked.

Map of the ecoregions and sub-ecoregions of Massachusetts:

Ecoregions (or ecological regions) are areas of relatively homogeneous ecological systems, including vegetation, soils, climate, geology, and patterns of human uses. Ecoregion boundaries have been developed for the United States to provide an ecological framework for inventorying and assessing environmental resources. Massachusetts falls within two ecoregions of the United States—the **Northeastern Highlands** and the **Northeastern Coastal Zone**. Sub-ecoregions of Massachusetts have been delineated (Figure 1; Griffith et al. 1994), and they are particularly useful for statewide ecological inventory and assessment activities, including vegetation classification.

There are thirteen sub-ecoregions in Massachusetts. Complete descriptions are given in Griffith et al. (1994), but a brief synopsis of their descriptions is given below:

Northeastern Highlands:
The ***Taconic Mountains*** sub-ecoregion is a hilly and mountainous region of western Massachusetts that includes Mt. Greylock, the highest elevation in the state (3491 feet). Streams are generally small and high-gradient, and there are few lakes. The vegetation is primarily northern hardwoods (maple-beech-birch) with spruce-fir at higher elevations. The ***Western New England Marble Valleys***, also known as the Berkshire Valley, consists of calcitic and dolomitic marbles and limestones bedrock. Surface water alkalinity values in the area are the highest in Massachusetts (>1000 µeq/L; Griffith et al. 1994) due to the underlying limestone and marble. Alkaline groundwater results in mineral-rich and species-rich wetlands in the region, particularly calcareous fens. The Hoosic and Housatonic Rivers are the major drainages. The ***Green Mountains/Berkshire Highlands*** includes the southern extent of the Green Mountains and the Berkshire Hills; elevations range from 1000 to 2500 feet. Northern hardwoods and spruce-fir characterize the forested uplands. The Deerfield and upper Westfield Rivers are the main river basins. The ***Lower Berkshire Hills*** is similar to the Green Mountains/Berkshire Highlands sub-ecoregion except that it has an overall lower elevation, generally 1000 to 1700 feet. Spruce-fir is generally lacking, and northern hardwoods are mixed with transition hardwoods (maple-beech-birch, oak-hickory). Lakes and ponds are abundant compared to the rest of western Massachusetts. The ***Berkshire Transition*** ranges in elevation from 400-1400 feet, and forest types are transition hardwoods and northern hardwoods. Surface waters drain to the Westfield and Connecticut River basins. The ***Vermont Piedmont*** has a similar elevation range as the Berkshire Transition, but underlying limestone and marble result in surface waters with higher alkalinity (500-1000 µeq/L). Surface waters drain into the Deerfield and Connecticut River basins. The ***Worcester/Monadnock Plateau*** contains the most hilly and mountainous area of Massachusetts' central upland. Elevations range from 500 to 1400 feet with some peaks above 1800 feet (Mt. Watatic and Mt. Wachusett). Transition hardwoods are common, but

northern hardwoods also occur. Forested wetlands are common, and forested and non-forested peatlands are abundant. Surface waters are acidic with alkalinity values less than 50 µeq/L.

Northeastern Coastal Zone:

The ***Connecticut Valley*** is characterized by thick outwash, alluvial, and lake bottom deposits overlaying sedimentary bedrock. Surface water alkalinity values are generally above 500 µeq/L. Central hardwoods (oak-hickory) and transition hardwoods are the major forest types. The ***Lower Worcester Plateau/Eastern Connecticut Upland*** ranges in elevation from 500 to 1200 feet. The soils of the area developed primarily on glacial till in the uplands, and on stratified sand, gravel, and silt deposits in the valleys. Surface waters are acidic and drain primarily into the Chicopee and Quinebaug River systems. The ***Southern New England Coastal Plains and Hills*** is the largest sub-ecoregion in southern New England and is variable in its topography and bedrock. Bedrock types are mostly granites, schist and gneiss. Surface water alkalinity values are generally lower than in the Connecticut Valley, ranging from less than 50 to 500 µeq/L. Central hardwoods are dominant. The ***Boston Basin*** has low, rolling topography that is dominated by urban and suburban land. The ***Narragansett Bristol Lowlands*** are similar to the Coastal Plains and Hills, but bedrock outcrops are uncommon, and thick glacial till and outwash deposits cover the area. The lowlands are flat to gently rolling with elevations less than 200 feet. Surface water alkalinity values are generally between 100 to 300 µeq/L, but several areas have values less than 50 µeq/L. The vegetation is mostly central hardwoods. The ***Cape Cod/Long Island*** sub-ecoregion is characterized by terminal moraines and outwash plains left by the glaciers, and by coastal deposits. The landscape is influenced by wind and water. Elevations are less than 200 feet. There is a moderate maritime climate, and stunted oak and pine forests are typical. Surface water alkalinity values are low (less than 50 µeq/L).

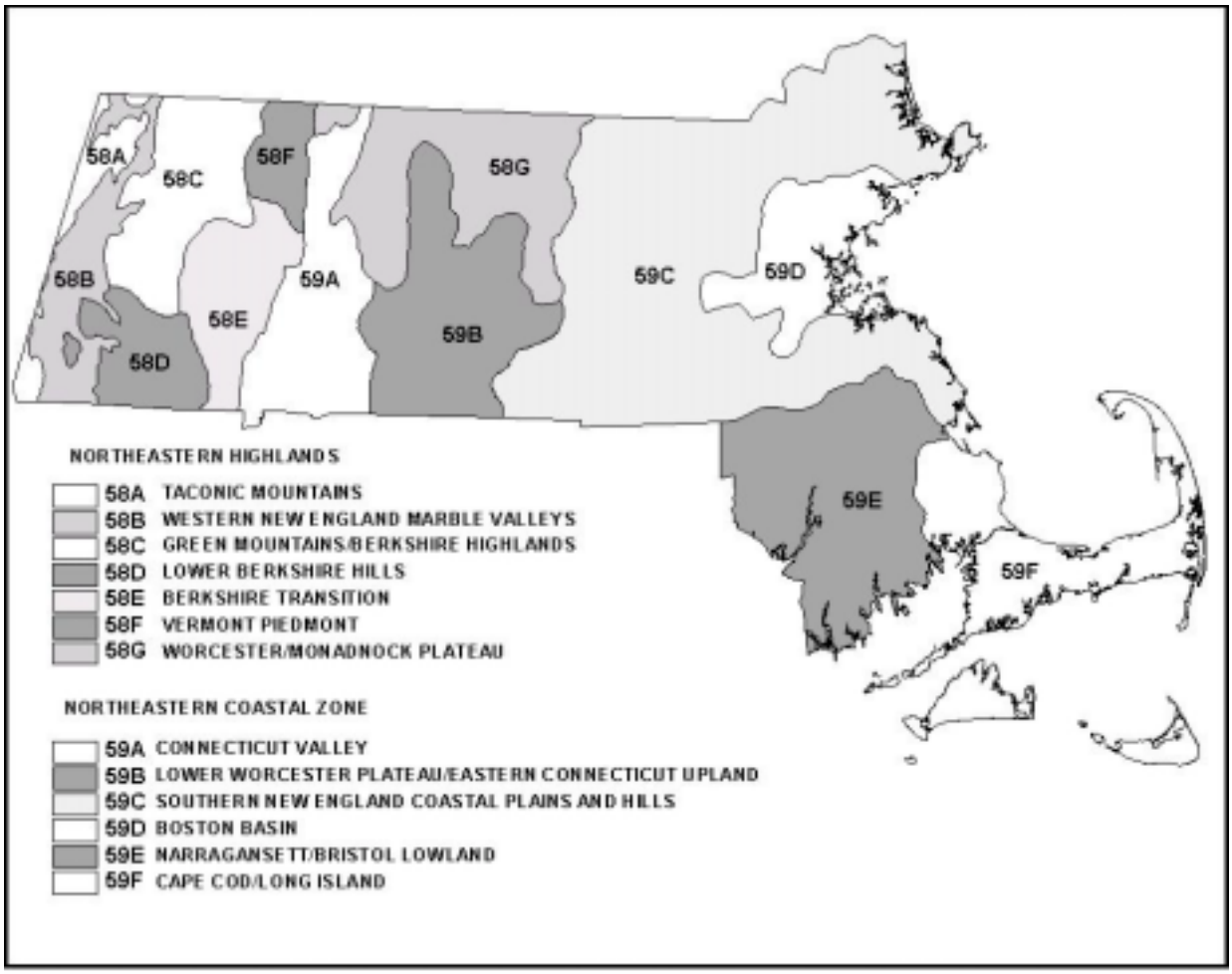


Figure 1. Ecoregions and sub-ecoregions of Massachusetts (Griffith et al. 1994)

In the vegetation classification, each community description is accompanied by a sub-ecoregion line map showing the sub-ecoregion boundaries. Sub-ecoregions in which the community type is known to occur (i.e., NHESP has field data for the community including vegetation descriptions and/or plot data) are shaded in dark gray, and the sub-ecoregions with probable occurrences (i.e., field data are currently lacking but the community has been observed in the sub-ecoregion or the sub-ecoregion is known to have the appropriate physical conditions) are shaded in light gray. If the community is not believed to occur in a certain sub-ecoregion, then that sub-ecoregion is left white.

The community sub-ecoregion maps are intended to give the user an idea of where s/he may encounter a certain community type and also to identify sub-ecoregions for which community data are needed. Readers are encouraged to look in sub-ecoregions identified as having probable occurrences of the community (light gray). All new data and distribution information is welcome and much appreciated.

Concept: Brief general description or word-picture of the community.

Environmental setting: Detailed description of the landscape setting, soils, water chemistry, and other physical characteristics of the community.

Vegetation Description: Detailed description of the vegetation structure and characteristic plant species of the community.

Associations: List of the vegetation associations that have been described in Massachusetts that are either equivalent to the community or included within the community. For example, Motzkin (1991) described six Atlantic white cedar (AWC) associations in Massachusetts. Coastal AWC swamps are equivalent to his Coastal AWC type, while Inland AWC swamps include both his Mixed hemlock-AWC-red maple-yellow birch type and his Spruce-hemlock-AWC type.

Habitat values for: Associated Fauna Description of the habitat that the community provides for animals, including birds, small mammals, amphibians, invertebrates, etc.

Associated rare plants: A list of rare plants that are known to occur in the community type. Rare plants include those that are state-protected under the Massachusetts Endangered Species Act and those that are on the state watch list. Plants on the watch list are not legally protected, but they are believed to be uncommon or rare. They are species for which information is lacking on number of sites and severity of population decline, or species that have been delisted.

Plant Latin name	Plant common name	Plant state status E= State Endangered T= State Threatened SC= State Special Concern WL= State Watch List H= State Historic

Associated rare animals: A list of rare animals that are known to occur in the community type. Rare animals include those that are state-protected under the Massachusetts Endangered Species Act (birds on the bird watch list are also included). Format and abbreviations follow those used for Associated rare plants (see above).

Examples: OR Examples with Public Access: List of representative examples of the community in areas with public access. For particularly sensitive communities, specific examples are not listed.

Threats: A description of known threats to the community.

Management needs: A description of management activities that may be necessary to maintain community occurrences and the quality of those occurrences.

Inventory need rank: Each community is ranked from 1 to 3 based on its need for inventory efforts. Communities with high need (rank of 1) are lacking field data. Little is known about their abundance, distribution, physical setting, or species composition. They are the highest priority for field work. Communities ranked 3 have low need for inventory; these communities have recently been investigated in detail including statewide landscape analyses and vegetation classification.

Inventory comments: Written comments providing specifics on the inventory needs of the community.

Synonyms: Names used for the Massachusetts community in other natural community classifications. If a synonym is listed without any modifier, then the Massachusetts community is basically equivalent to the synonym. Sometimes the following modifiers are used: "includes" means that the Massachusetts community includes the communities listed, "included within" means that the Massachusetts community is included within the community listed, "similar to" means that the Massachusetts community is similar but not equivalent to the communities listed, and "not described" is used when the Massachusetts community has no synonym in that classification. Question marks indicate uncertainty about synonyms.

USNVC/TNC: Synonyms in the National Vegetation Classification. Sneddon, L., M. Anderson, and J. Lundgren eds. 1998. International classification of ecological communities: terrestrial vegetation of the Northeastern United States (July 1998 working draft). The Nature Conservancy, Eastern Conservation Science and Natural Heritage Programs of the northeastern U.S. Boston, MA. [Association codes are written in brackets.]

MA (old name): Old name used by the Massachusetts Natural Heritage Program. Rawinski, T.J. 1984. New England natural community classification. The Nature Conservancy, Eastern Regional Office, Boston, MA. [old EOCODES are written in brackets].

ME: Synonyms in the Maine vegetation classification.
Gawler, Susan C. 2001. Natural Community Profiles, Open (non-forested) types. Maine Natural Areas Program, Department of Conservation, Augusta, Maine.
Maine Natural Heritage Program. 1991. Natural Landscapes of Maine: A Classification of Ecosystems and Natural Communities. Department of Economic and Community Development, State House Station 130, Augusta, ME.

VT: Synonyms in the Vermont vegetation classification.
Thompson, E. 1995. Natural Communities of Vermont: Uplands and Wetlands. Vermont Nongame and Natural Heritage Program, Department of Fish and Wildlife, Agency of Natural Resources. Waterbury, VT.

NH: Synonyms in the New Hampshire vegetation classification.
Sperduto, D.D. 1994. A Classification of the Natural Communities of New Hampshire. New Hampshire Natural Heritage Inventory, Dept. of Resources and Economic Development. Concord, NH. (used for palustrine) AND
Sperduto, D.D. 1997. The Natural Communities of New Hampshire: A Guide and Classification. Draft. November 21, 1997. New Hampshire Natural Heritage Inventory, Dept. of Resources and Economic Development. Concord, NH.

NY: Synonyms in the New York vegetation classification.
Reschke, C. 1990. Ecological Communities of New York State. New York Natural Heritage Program, N.Y.S. Dept. of Environmental Conservation. Latham, NY.

CT: Synonyms in the Connecticut vegetation classification.

Metzler, K.J. & J.P. Barrett. 1996. Vegetation classification for Connecticut, Organized into the modified UNESCO hierarchy. Draft report, Connecticut Natural Diversity Database. Hartford, CT.

RI: Synonyms in the Rhode Island vegetation classification.
Enser, R. 1995. Natural Communities of Rhode Island. Rhode Island Natural Heritage Program, Providence, RI.

Golet & Larson, 1974: Synonyms in Golet, F.C. and J.S. Larson. 1974. Classification of freshwater wetlands in the glaciated Northeast. US Fish and Wildlife Service Resource Publication 116, Washington D.C. [Used in Palustrine section.]

Weatherbee: Synonyms in Weatherbee, P.B. 1996. Flora of Berkshire County. The Berkshire Museum, The Studley Press, Inc. Dalton, MA. 123 pp. [Used in Terrestrial section.]

Other: Synonyms in other miscellaneous vegetation classifications.

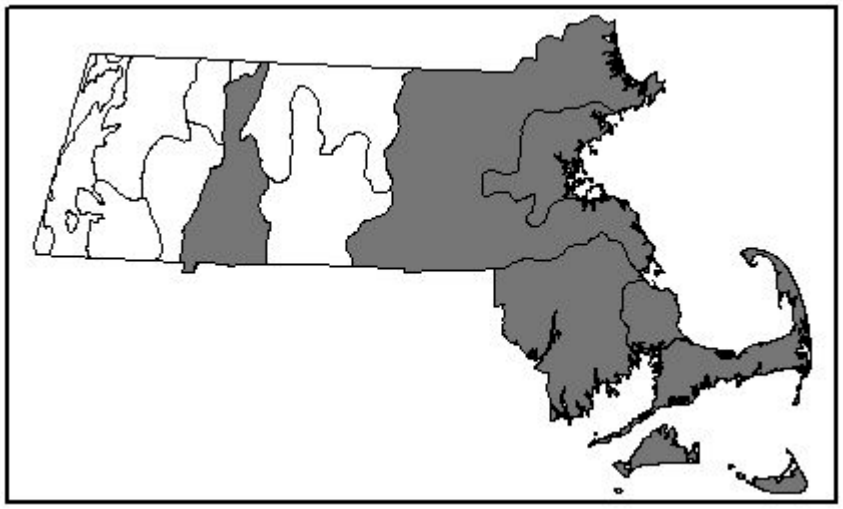
Author: Person responsible for writing community description. **Date:** Date last revised.

Community Name: **CULTURAL GRASSLAND**

Community Code: CT2B2A1000

SRANK: -

Tracked: No



This distribution map focussed on cultural grasslands occurring on sandplains.

Concept: A human created and maintained open community dominated by grasses, normally maintained by mowing; primarily of conservation interest for the grassland bird community.

Environmental Setting: A grassland community that generally occurs on sand or other droughty, low nutrient soils. Surroundings, in many areas include Pitch pine / Scrub oak communities. Many small airports with surrounding grasslands were built on sand plains. Pastures and hayfields occur in all areas, and surroundings reflect the regional variations.

Vegetation Description: Airports, cemeteries, pastures, and hayfields provide different habitats, and support different species of plants and animals. Grasslands at many smaller airports are dominated by graminoids, usually little blue stem grass (*Schizachyrium scoparium*), Pennsylvania sedge (*Carex pensylvanica*), and poverty grass (*Danthonia spicata*), and many non-native species. Some cultural grasslands do have some mix of herbaceous species, such as goldenrods (*Solidago* and *Euthamia* spp.) and milk weeds including butterfly weed (*Asclepias* spp. and *A. tuberosa*).

Associations: Grasslands at airports tend to have more native grasses than do fields that are, or were recently, cultivated. Cemeteries are variable, some older ones have more native species than do more actively managed, newer cemeteries. Most cultural grasslands are mowed at least annually to maintain the grassland stage. Hayfields have fewest native species, but do support grassland birds.

Habitat Values for Associated Fauna: Distance to the coast and size of the grassland strongly affect the species that use a grassland. Many species of birds that use grasslands are more common in the midwestern prairies and agricultural fields. Airports currently support Massachusetts' largest populations of Upland Sandpipers (*Bartramia longicauda*), Grasshopper Sparrows (*Ammodramus savannarum*), and Savannah Sparrow (*Passerculus sandwichensis*). Other grassland birds are found in different habitats - such as Bobolinks (*Dolichonyx oryzivorus*) in hayfield length taller grass, Eastern Meadowlarks (*Sturnella magna*) in pasture length short grass. Other grassland birds include Killdeer (*Charadrius vociferus*), Northern Meadowlarks (*Sturnella magna*), and Horned Larks (*Eremophila alpestris*). Meadow voles (*Microtus pennsylvanicus*), meadow jumping mouse (*Zapus hudsonius*), and the northern short-tailed shrew (*Blarina brevicauda*) would be expected in most grasslands. They would be hunted by garter snakes (*Thamnophis sirtalis*), long-tailed weasels (*Mustela frenata*), Kestrels (*Falco sparverius*), and wintering Northern Harriers (*Circus cyaneus*), Snowy Owls

(*Nyctea scandiaca*), and Short-eared Owls (*Asio flammeus*).

Associated Rare Plants:

ASCLEPIAS TUBEROSA	BUTTERFLY-WEED	- WL
LUPINUS PERENNIS	WILD LUPINE	- WL

Associated Rare Animals:

AMMODRAMUS SAVANNARUM	GRASSHOPPER SPARROW	T
BARTRAMIA LONGICAUDA	UPLAND SANDPIPER	E
CYCNIA INOPINATUS	UNEPECTED CYCNIA	SC
CICINDELA PURPUREA	PURPLE TIGER BEETLE	SC
FARONIA RUBIPENNIS	THE PINK STREAK	T
POOECETES GRAMINEUS	VESPER SPARROW	T

Examples with Public Access: Access is limited at airports. Massachusetts Military Reservation, Bourne and Sandwich; Orange Airport, Orange; Turner's Falls Airport, Turner's Falls; Logan Airport, Boston.

Threats: Exotics - especially cool season grasses that form mats. Common non-native species include sheep fescue (*Festuca ovina*), sweet vernal grass (*Anthoxanthum odorata*), velvet-grass (*Holcus lanatus*), bluegrass (*Poa pratensis*), timothy (*Phleum pratense*), and others.

Management Needs: Fire management plans should be produced and followed to introduce prescribed fire to the best examples. Reduce exotics where possible.

Inventory Need Rank: 3

Inventory Comments:

Synonyms:

USNVC/TNC: Related to: Schizachyrium scoparium - Sorghastrum nutans - Herbaceous Alliance -- Schizachyrium scoparium - Sorghastrum nutans - Hypoxis hirsuta - Baptisia tinctoria Herbaceous Vegetation [CEGL006187]; Schizachyrium scoparium ssp. littorale shrub herbaceous Alliance [sparse woody Grassland] -- Myrica pensylvanica / Schizachyrium scoparium ssp. littorale - Danthonia spicata Shrub Herbaceous Vegetation [CEGL006067]; Danthonia spicata Herbaceous Alliance [possible, no association defined].

MA (old name): SANDPLAIN GRASSLAND - CULTURAL COMMUNITY

ME:

NH:

VT:

NY: Successional old field, Mowed lawn, Mowed lawn with trees.

CT:

RI:

Weatherbee:

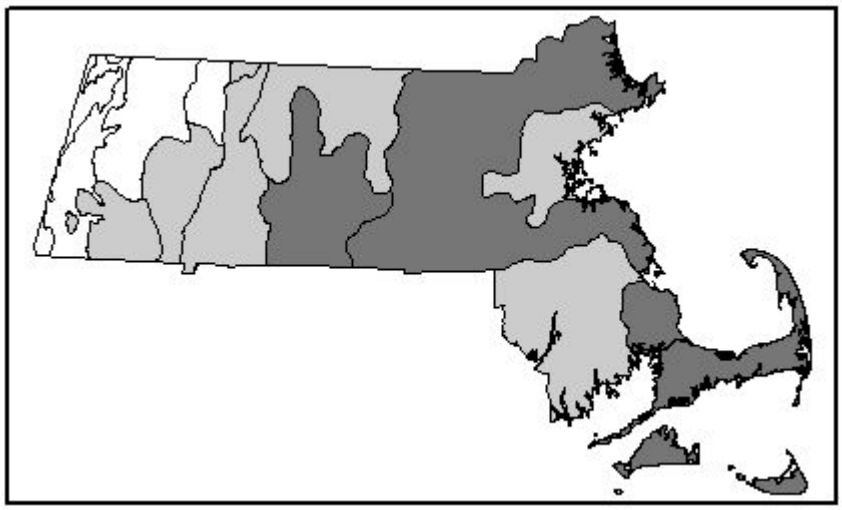
Author: P. Swain **Date:** 7/1/99

Community Name: **BLACK OAK - SCARLET OAK FOREST / WOODLAND**

Community Code: CT1A3B0000

SRANK: S3S4

Tracked: No



Concept: A fairly open oak / heath community maintained by regular light fire.

Environmental Setting: A community of dry, sandy or rocky slopes, but also on other xeric sites. Grades into mixed oak and pine-oak forests, and more open communities. Except on the driest sites, without regular fire the community tends to change to include more white oak, chestnut oak, red oak, and hickories. Without fire, there tends to be deep oak leaf litter with slow decomposition.

Vegetation Description: Black oak (*Quercus velutina*) is the dominant canopy species. White oak (*Q. alba*) and red maple (*Acer rubrum*) are common associates. A sparse subcanopy may have species of recent disturbance such as grey birch (*Betula populifolia*), black cherry (*Prunus serotina*), and sassafras (*Sassafras albidum*), as well as species less tolerant of fire such as flowering dogwood (*Cornus florida*) or shadbush (*Amelanchier arborea*). Lowbush blueberries, (*Vaccinium angustifolium* and *V. pallidum*), huckleberry (*Gaylussacia baccata*), and scrub oak (*Quercus ilicifolia*) form a fairly dense, but clumped low shrub layer, with scattered maple-leaved viburnum (*Viburnum acerifolium*) and American hazelnut (*Corylus americana*). Sedges (*such as Carex pensylvanica*), bracken fern (*Pteridium aquilinum*), and pink lady's slipper (*Cypripedium acaule*) are often scattered in the open herbaceous layer. On Martha's Vineyard, black oak grows with white oak (*Q. alba*) and post oak (*Q. stellata*) in open, savanna-like woodlands with dense heath understories, in mosaics with grasslands, heathlands, and scrub oak communities.

Associations: Part of a continuum of dry, acidic communities that contain a variety of tree oak and pine species. More work is needed to define types.

Habitat Values for Associated Fauna: Black oak acorns are important food for white-tailed deer (*Odocoileus virginianus*), black bear (*Ursus americanus*), grey squirrels (*Sciurus carolinensis*), other small rodents, and Wild Turkeys (*Meleagris gallopavo*) and other birds. The understory of blueberries and huckleberries is used by many of these same species in areas with sufficiently large forests to provide all the habitat needs. Passerine birds of oak forests include Red-eyed Vireo (*Vireo olivaceus*), White-breasted Nuthatch (*Sitta carolinensis*), Ovenbird (*Seiurus aurocapillus*), Black-and-white Warbler (*Mniotilta varia*), Scarlet Tanager (*Piranga olivacea*), Great Crested Flycatcher (*Miarchus crinitus*), and Downy Woodpecker (*Picoides pubescens*). [Listing proposed 2000, (*Rhodoecia aurantiago*) Orange Sallow Moth T]

Associated Rare Plants:

Associated Rare Animals:

APODREPANULATRIX LIBERARIA	NEW JERSEY TEA INCHWORM	T

Examples with Public Access: Green Hill Park, Worcester; Broad Meadow Brook Wildlife Sanctuary, Worcester; Quabog WMA, Brookfield; Manuel F. Correllus State Forest, Martha's Vineyard.

Threats: fire suppression, severe wildfire, and exotics.

Management Needs: Prescribed fire, exotic removal.

Inventory Need Rank: 2

Inventory Comments:

Synonyms:

USNVC/TNC: Quercus velutina - Q. alba Forest Alliance -- Quercus coccinea- Q. velutina/ Sassafras albidum/ Vaccinium pallidum Forest [CEGL006375].

MA (old name): BLACK OAK SAVANNA.

ME: Not described.

NH: Part of: 1997 - Dry Rich Appalachian oak- hickory- forest, Appalachian oak/ heath variant.

VT: Part of: Dry oak Woodlands.

NY: part of: Appalachian Oak - pine forest.

CT: Quercus velutina - (Quercus prinus) Forests -- Quercus velutina/ Gaylussacia baccata community and Quercus velutina / Vaccinium pallidum community.

RI: Mixed oak - pine forest.

Weatherbee: Not described.

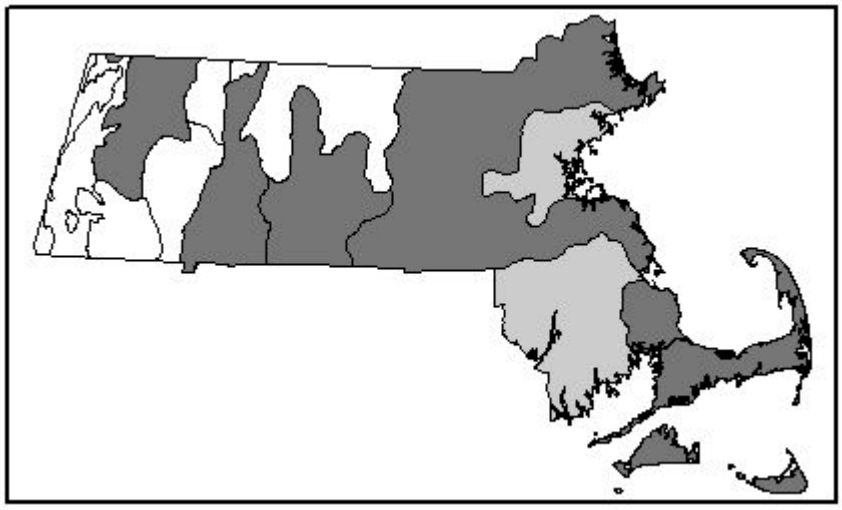
Author: P. Swain **Date:** 8/23/99

Community Name: **OAK - HICKORY FOREST**

Community Code: CT1B2B0000

SRANK: S4

Tracked: No



Concept: A hardwood forest dominated by a mixture of oaks with hickories mixed in at a lower density.

.Environmental Setting: Well drained sites, such as upper slopes, ridgetops, usually with west and south -facing aspects.

Vegetation Description: A broadly defined, variable, forest type. The canopy is dominated by one or several oaks (*Quercus rubra, Q. alba, Q. coccinea,* and *Q. velutina*). Mixed in are lower densities of one or several hickories (*Carya ovata, C. tomentosa, C. glabra,* and *C. ovalis*). Other trees include with ash (*Fraxinus americana*), black birch (*Betula lenta*), sassafras (*Sassafras albidum*), and red maple (*Acer rubrum*). A subcanopy commonly includes hop hornbeam (*Ostrya americana*), flowering dogwood (*Cornus florida*), shadbush (*Amelanchier arborea*), chestnut (*Castanea dentata*), and witch-hazel (*Hamamelis virginiana*). Low shrubs are common and often diverse: maple-leaved viburnum (*Viburnum acerifolium*), blueberries (*Vaccinium angustifolium* and *V. pallidum*), beaked and American hazelnut(*Corylus cornuta* and *C. americana*), New Jersey tea (*Ceanothus americanus*), and gray dogwood (*Cornus racemosa*) are characteristically present. The herbaceous layer is also richer than in many oak forests. Plants typical of the herbaceous layer include Hepatica (*Hepatica nobilis*), goldenrod (*Solidago bicolor*), tick-trefoil (*Desmodium glutinosum* and *D. paniculatum*), wild sarsaparilla (*Aralia nudicaulis*), rattlesnake weed (*Hieracium venosum*), and false Solomon's seal (*Maianthemum racemosa*), and Pennsylvania sedge (*Carex pensylvanica*).

Associations: Part of a continuum of dry, acidic communities that contain a variety of tree oak and pine species. More work is needed to define types. Hickory is seldom dominant enough to warrant being part of the name.

Habitat Values for Associated Fauna: Wild turkey (*Meleagris gallopavo*) are found in primarily oak areas. Dry oak forests support a smaller mix of animal species than are found in moister communities. There are no species known to be restricted to the Oak Hickory Forest community. Common species of dry sites include short-tailed shrew (*Blarina brevicauda*), red-backed vole (*Clethrionomys gapperi*), white footed mouse (*Peromyscus leucopus*), and chipmunks (*Tamias striatus*). Snakes of dry forest sites include garter snakes (*Thamnophis s. sirtalis*) and redbelly snakes (*Storeria o. occipitomaculata*). Birds that nest in oak forests include Eastern Wood-Pewee (*Contopus virens*), Red-eyed Vireo (*Vireo olivaceus*), Scarlet Tanager (*Piranga olivacea*), and Ovenbird (*Seiurus aurocapillus*).

Associated Rare Plants:

ACER NIGRUM	BLACK MAPLE	SC
CERASTIUM NUTANS	NODDING CHICKWEED	E
ISOTRIA MEDEOLOIDES	SMALL WHORLED POGONIA	E
LESPEDEZA VIOLACEA	VIOLET BUSH-CLOVER	- WL
LYGODIUM PALMATUM	CLIMBING FERN	SC
RANUNCULUS FASCICULARIS	EARLY BUTTECUP	- WL
SPHENOPHOLIS NITIDA	SHINING WEDGEGRASS	T

Associated Rare Animals:

NONE KNOWN

Examples with Public Access: Blue Hills Reservation, Milton; Minute Man National Historic Park, Lexington; Stacy Mountain, Gill; East Mountain WMA, Holyoke; Mt. Tekoa WMA, Russell; Mt. Meadow Preserve, Williamstown; Cape Cod Canal, Bourne.

Threats:

Management Needs:

Inventory Need Rank: 3

Inventory Comments: Widespread type. Not clear how distinct from mixed oak forest, coastal forest, or oak - white pine.

Synonyms:

USNVC/TNC: Quercus alba- (Quercus rubra, Carya spp.) Forest Alliance -- Quercus (alba, rubra, velutina)/ Cornus florida/ Viburnum acerifolium Forest [CEGL006336].

MA (old name): SNE MESIC CENTRAL HARDWOOD FOREST ON ACIDIC TILL.

ME: Similar to: Red oak - white oak forest.

NH: 1997 - Oak-hickory Forests; 1994 - Dry Appalachian Oak - Hickory Forest; AND Dry Appalachian Oak - Hickory Forest, Appalachian Oak / Herb Variant.

VT: Similar to: Mesic Transition Hardwood Forest (Oak-Hickory-Northern Hardwood Forest). and Dry oak-hickory-hop-hornbeam forest.

NY: Appalachian oak - hickory forest, Coastal oak – hickory forest.

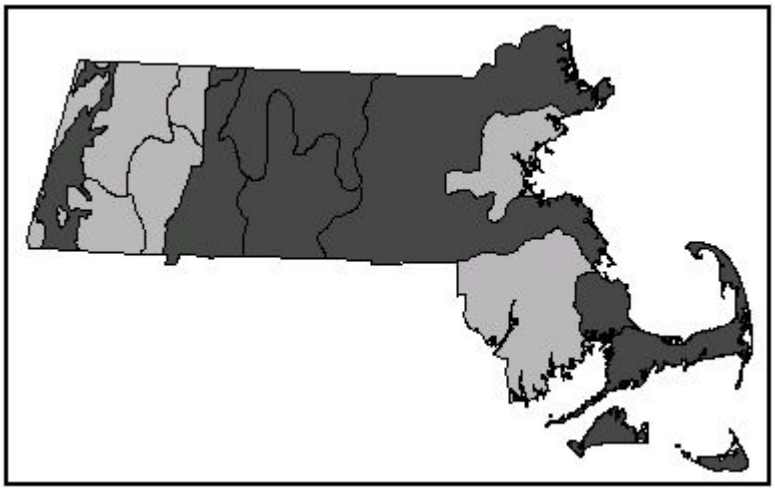
CT: Quercus rubra/ Cornus florida forests; AND Carya glabra - Fraxinus americana forests.

RI: Oak Hickory forest.

Weatherbee: Part of: Dry acidic oak/conifer forest community.

Author: P. Swain **Date:** 8/5/99

Community Name: **DEEP EMERGENT MARSH**
Community ELCODE: CP2A0A1200
SRANK: S4
Tracked: No



Concept: Tall graminoid/emergent herbaceous wetlands occurring on saturated, mucky mineral soils that are seasonally inundated and permanently saturated

Environmental setting: Deep emergent marshes generally form in broad, flat areas bordering low-energy rivers and streams or along pond and lake margins. The soils are a mixture of organic and mineral components. There is typically a layer of well-decomposed organic muck at the surface overlying mineral soil. There is standing or running water during the growing season and throughout much of the year. Water depth averages between 6 in. and 3 ft. Deep emergent marshes are associated with shrub swamps, and the two communities intergrade.

Vegetation Description: Tall graminoids, like broad-leaved cat-tail (*Typha latifolia*) and phragmites (*Phragmites australis*), often form extensive dense stand s. Narrow-leaved cat-tail (*Typha angustifolia*) occurs in more alkaline sites or in saline areas along roads [Weatherbee, 1996]. Other characteristic graminoids include wool-grass (*Scirpus cyperinus*), common threesquare (*Scirpus pungens*), Canada bluejoint (*Calamagrostis canadensis* var. *canadensis*), rice cut-grass (*Leersia oryzoides*), and tussock-sedge (*Carex stricta*). Herbaceous associates include arrow-leaf tearthumb (*Polygonum sagittatum*), bulblet water-hemlock (*Cicuta bulbifera*), swamp-candles (*Lysimachia terrestris*), beggar-ticks (*Bidens* spp.), bedstraw (*Galium* spp.), common arrowhead (*Sagittaria latifolia* var. *latifolia*), slender-leaved goldenrod (*Euthamia tenuifolia*) and marsh-fern (*Thelypteris palustris* var. *pubescens*). Nutrient-rich sites in Berkshire County typically have cat-tails mixed with soft-stemmed bulrush (*Scirpus tabernaemontani*), hard-stemmed bulrush (*S. acutus*), river-horsetail (*Equisetum fluviatile*), marsh-cinquefoil (*Comarum palustre*), sweet-flag (*Acorus calamus*), bristly sedge (*Carex comosa*), lakeside sedge (*C. lacustris*), and giant bur-reed (*Sparganium eurycarpum*) among others [Weatherbee, 1996].

Associations: No associations have been described in Massachusetts.

Habitat values for Associated Fauna: Deep emergent marshes are excellent waterfowl habitat and also provide important habitat for frogs and newts, especially leopard, pickerel, green and bull frogs, and red-spotted newts. Wood frogs may use areas of deep emergent marsh that are fish free.

Associated rare plants:

CAREX ALOPECOIDEA	FOXTAIL SEDGE	T
LUDWIGIA SPHAEROCARPA	ROUND-FRUITED FALSE-LOOSESTRIFE	T
POLYGONUM SETACEUM VAR INTERJECTUM	STRIGOSE KNOTWEED	SC
SCIRPUS FLUVIATILIS	RIVER BULRUSH	SC

Associated rare animals:

ARDEA HERODIAS	GREAT BLUE HERON	- WL
BOTAURUS LENTIGINOSUS	AMERICAN BITTERN	E
CIRCUS CYANEUS	NORTHERN HARRIER	T
CISTOTHORUS PALUSTRIS	MARSH WREN	- WL
CLEMMYS GUTTATA	SPOTTED TURTLE	SC
CLEMMYS INSCULPTA	WOOD TURTLE	SC
EMYDOIDEA BLANDINGII	BLANDING'S TURTLE	T
GALLINULA CHLOROPUS	COMMON MOORHEN	SC
IXOBRYCHUS EXILIS	LEAST BITTERN	E
PODILYMBUS PODICEPS	PIED-BILLED GREBE	E
RALLUS ELEGANS	KING RAIL	T
SOREX PALUSTRIS	WATER SHREW	SC

Examples: Quinebaug River; Quaboag River WMA

Threats: Deep emergent marshes are threatened by filling and dredging, impoundments that alter natural water-level fluctuations, and nutrient inputs from adjacent roads, fields, or septic systems. Purple loosestrife (*Lythrum salicaria*), an aggressive non-native species, can be abundant in deep emergent marshes throughout the state. Phragmites is also a problem.

Management needs: Removal of purple loosestrife and phragmites.

Inventory need rank: 2

Inventory comments: Statewide inventory of marshes and wet meadows is needed.

Synonyms:

USNVC/TNC: Phalaris arundinacea Eastern Herbaceous Vegetation [CEGL006335]; Phragmites australis semipermanently flooded ruderal herbaceous vegetation [CEGL004141]; Typha (angustifolia, latifolia)-(Scirpus spp.) eastern herbaceous vegetation [CEEGL006153]; Pontederia cordata-Peltandra virginica semipermanently flooded herbaceous vegetation [CEGL004291].

MA [old name]: Southern New England nutrient-poor streamside/lakeside marsh [CP4A2A.0000]; Southern New England nutrient-rich streamside/lakeside marsh [CP4A1A0000].

ME: Cattail marsh community.

VT: Cattail marsh; Deep rush marsh.

NH: Deep emergent marsh.

NY: Deep emergent marsh.

CT: Not described.

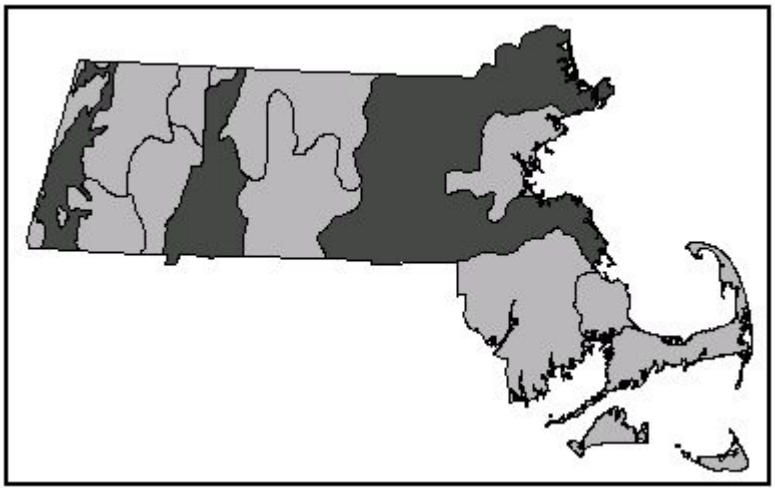
RI: Semipermanently flooded (deep) emergent marsh.

Golet & Larson, 1974: Robust deep marsh (DM-4); narrow-leaved deep marsh (DM-5); broad-leaved deep marsh (DM-6).

Other: Robust emergent marsh [Weatherbee, 1996].

Author: J. Kearsley **Date:** 7/21/99

Community Name: **MUD FLAT**
Community ELCODE: CP2A0B2100
SRANK: S4
Tracked: No



Concept: Sparsely vegetated herbaceous community dominated by low, usually annual herbs occurring on muddy streamsides or in shallow water of river backwaters and old oxbow ponds.

Environmental setting: Shallow water or open mud flats along streams, in backwaters, abandoned channels, lagoons, and oxbow ponds. Inundation by spring floods does occur, and the mucky, silty mineral soils are poorly drained.

Vegetation Description: Although often sparsely vegetated, mudflats typically have a high species richness (that is, have a large number of species). Winged (*Mimulus alatus*) and long-stalked (*Mimulus ringens*) monkey-flowers are good indicator species. Large and lesser water-plantains (*Alisma plantago-aquatica* var. *americanum* and *var. parviflorum*), arrowheads (*Sagittaria* spp.), arrow-arum (*Peltandra virginica*), and bur-reeds (*Sparganium* spp.) are often dominant. Other associated species include sensitive fern (*Onoclea sensibilis*), false nettle (*Boehmeria cylindrica*), clearweed (*Pilea pumila*), water-hemlock (*Cicuta maculata*), sweet flag (*Acorus americanus*), wild calla (*Calla palustris*), water-parsnip (*Sium suave*), ditch-stonecrop (*Penthorum sedoides*), water-purslane (*Ludwigia palustris*), awned sedge (*Carex crinita*), river horsetail (*Equisetum fluviatile*), smartweeds (*Polygonum* spp.), and duckweeds (*Lemna* spp.). Floodplain forest trees, such as silver maple (*Acer saccharinum*) and American elm (*Ulmus americana*), often overhang these communities providing partial cover.

Associations: No associations have been described in Massachusetts.

Habitat values for Associated Fauna:

Associated rare plants:

ELEOCHARIS INTERMEDIA	INTERMEDIATE SPIKE-SEDGE	T
MIMULUS ALATUS	WINGED MONKEY-FLOWER	E

Associated rare animals:

FERRISSIA WALKERI	WALKER'S LIMPET	SC
POMATIOPSIS LAPIDARIA	RIVERBANK LOOPING SNAIL	E

Examples: Bennett Meadow WMA; Gill; Hop Brook, Lee; Cone Brook, Richmond.

Threats: True forget-me-not (*Myosotis scorpioides*) and moneywort (*Lysimachia nummularia*) are mat-forming, non-native plant species that can appear to be crowding out native plants. Purple

loosestrife (*Lythrum salicaria*) can also occur in these habitats.

Management needs: Eradication of moneywort and true forget-me-not, especially in areas where they are associated with winged monkey-flower, a state-protected rare plant species.

Inventory need rank: 2

Inventory comments:

Synonyms:

USNVC/TNC: River mud flats sparse vegetation [CEGL002314].

MA [old name]: Not described.

ME: Similar to Riverine emergent community.

VT: River mud shore community.

NH: Not described.

NY: Not described.

CT: Not described.

RI: Not described.

Golet & Larson, 1974: Not described.

Other:

Author: J. Kearsley **Date:** 7/21/99