

**BASELINE DOCUMENTATION REPORT  
and  
LAND MANAGEMENT PLAN**

**Massachusetts Executive Office of Energy and Environmental Affairs  
Local Acquisitions for Natural Diversity (LAND) Grant Program**

**Property name: Crow Hill North (formerly known as Ecotarium West)**

**Municipality: Worcester**

**Date acquired: June 26, 2014**

**Registry: Worcester**

**Book/page: 52476 / 346**

**LAND #: 13**

**Date of report: May 13, 2014, last revised December 23, 2014**

**Property location: Southern portion of 145 Harrington Way**

**Size: 13.7 acres**

**Interest held by city/town: FEE**

**Other interest holders: Conservation Restriction held by Greater Worcester Land Trust (Book 53193, Page 93)**

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**Attachment A** – Conservation Restriction held by Greater Worcester Land Trust (Book 53193, Page 93).

**Attachment B** - EcoTarium Savanna Lands Management Study.

## **Table of Contents**

### **Section I: Property Information**

1. Property description
2. LAND grant program regulations
3. Legal protection
4. Contact information
5. Land Use and Management Plan (if fee owned by town) and Copy of Conservation Restriction (if CR)

### **Section II: Maps**

1. Resource map
2. Monitoring map

### **Section III: Site Visit Report**

1. General information
2. Current property conditions
3. Boundary conditions

### **Section IV: Photographs**

1. Photo location map
2. List of photographs
3. Photographs

### **Section V: Amendments**

### **Section VI: Signatures**

## **Section I:** **Property Information**

### **I.1. Property description**

The Crow Hill North property, located at 145 Harrington Way, Assessors' map/lot 19-29A-00002 (southern portion), is  owned by City of Worcester, custody of Worcester Conservation Commission

subject to a Conservation Restriction held by the Greater Worcester Land Trust.

### **I.2. Local Acquisitions for Natural Diversity (LAND) grant program regulations**

This property is permanently protected open space, for conservation and passive recreation only. It is subject to the standards and guidelines in 301 CMR 5.00: Self-Help and Urban Self-Help Programs, of the Division of Conservation Services, Executive Office of Energy and Environmental Affairs (EEA). Excerpted here are some of the major points:

- 5.06(4): Under the care and control of the City of Worcester Conservation Commission
- 5.09(1): The property must be used at all times for open space conservation and passive recreation purposes only, in accordance with MGL Ch. 132A, Sec. 11
- 5.09(1): The property is permanently protected under Article 97 of the Massachusetts Constitution, and may not be converted to other uses. Municipalities must pursue all feasible alternatives to conversion of grant-funded land. If conversion is finally determined to be the only possible choice, *all* of the following must occur: municipal approval of the conversion; a two-thirds majority vote of both houses of the state legislature; replacement of the land with new conservation land that is of equal or greater fair market value at the time of conversion, and of equal or greater acreage, ecological value, and usefulness, to be approved or disapproved by the Secretary of EEA.
- 5.09(2): If this property ceases to be used in whole or in part for conservation and/or passive recreation purposes, all interest in the property shall revert to the Commonwealth, unless the Secretary demands specific performance of the grant contract. The City of Worcester Conservation Commission must notify the Secretary of EEA of a change or potential change to an inconsistent use, or, the Secretary of EEA may notify the Conservation Commission that an inconsistent change in use has occurred. The Conservation Commission has 90 days to rectify the use to the satisfaction of the Secretary, or it will revert to the Commonwealth.
- 5.08 (2) and (3): Open to use by all members of the public without discrimination.
- 5.08(1): In accordance with the LAND program regulations, the City of Worcester Conservation Commission may impose reasonable limits on the type and extent of use of this area and facilities acquired, as necessary for maintenance or preservation.
- 5.06(1): Off-street parking may be required.
- No private enterprise may occur on properties for which the fee simple or encumbered fee is owned by the municipality, except that which contributes to and does not conflict with appropriate public use and benefit.

- Structures are prohibited on properties for which the fee interest is owned by the municipality, except those that further conservation or public passive recreational use of the property.

**I.3. Legal protection**

Through receipt of funding through the LAND grant program, this property is permanently protected under Article 97 of the Constitution of the Commonwealth of Massachusetts.

- *Ch. 132A, §11 – Act establishing the Self-Help (now LAND) grant program*
- *Ch. 40, §8c – Authority of conservation commissions to hold land for conservation purposes*
- *Article 97 – Prohibits conversion of the property from conservation and recreational use*
- *LAND Project Agreement – Prohibits conversion of the property from conservation and recreational uses. Requires mitigation in the event of conversion. Requires appropriate public access. Recorded with deed.*
- *Additional legal protections – Conservation Restriction held by the Greater Worcester Land Trust*

**I.4. Contact Information**

Provide contact information for property monitor or manager, landowner (if CR), and any other people or organizations involved in the property.

Name (organization)	Title (e.g. property monitor)	Mailing address	Phone
City of Worcester Conservation Commission	Fee Holder	455 Main St., Suite 404, Worcester, MA	508-799-1400 * 260
Greater Worcester Land Trust	Property monitor, manager, and Conservation Restriction holder	4 Ash St. Worcester, MA 01608	508-795-3838

## **I.5. Land Use & Management Plan**

All LAND-funded properties must provide access to the general public for passive recreational activities. The specific subset of permissible passive activities varies from project to project and is described here.

### **Land Management Plan:**

#### ***Purpose:***

A. The Premises provide open space for public enjoyment and will be open to the general public for educational purposes, hiking, bird watching, passive outdoor recreation, and similar uses;

B. The Premises provide a relatively natural area offering a diversity of habitat for plants and animals;

C. A scenic view of Worcester, worthy of being preserved and made available to the public, exists from the top of Crow Hill North on the Premises. The Conservation Restriction will allow that the general public have access to the Premises in order to enjoy the view through mowing, pruning and selective tree removal;

D. Preservation of the Premises, by prohibiting alterations to the natural character thereof, will protect the area's scenic and open space value and enhance the passive recreational, human enjoyment, and ecological value of this conservation open space;

E. Preservation of the natural landscape, including a complex of geology and natural communities of drumlin, granite outcrop, wetland system, and pyrophytic (fire-loving) Black Oak Savannah habitat that are distinctly and uniquely Worcester;

F. Contributing to the overall ecological health of the Fitzgerald Brook, for which the Premises serve as a source water. The Fitzgerald Brook is a tributary of Lake Quinsigamond;

G. Promoting environmental education of the City's natural resources by providing a readily accessible educational resource to the adjacent North High School, a Worcester public school, and the non-profit Ecotarium museum of natural history; and

H. Addressing a stated governmental public policy goal by preserving one of Worcester's "Top Ten" open space areas, as officially identified and adopted in 1987 by the Worcester City Council.

***Permitted public activities:***

Note: These should be posted at the property entrance(s).

- Walking, hiking, nature study, bird watching, etc.
- Cross-country skiing, snowshoeing
- Picnicking
- Any other use of the Premises or activity thereon which does not materially impair the purposes of this Land Management Plan or other significant conservation interests, at the discretion of the Conservation Commission.

- This list can be amended. See ‘Section V – Amendments’ for a process to be used. Some of the additional uses that the Commission may consider (permanently or on a case-by-case basis) are:
  - Bicycle riding on designated trails
  - Camping
  - Hunting
  - Entry after dark (e.g. for star gazing), etc.

***Prohibited public activities:***

Note: These should be posted at the property entrance(s).

- Motorized vehicles
- Filling/Dumping
- Mining, Soil Excavation, etc.
- Vegetation destruction, cutting or removal
- Commercial recreational activities
- Construction of any temporary or permanent structure
- Any other use of the Premises or activity thereon which materially impairs the purposes of this Land Management Plan or other significant conservation interests, at the discretion of the Conservation Commission.

***Additional comments on use of this property:***

- Existing trails are currently used by hikers, North High School students, and Ecotarium educational programs. These trails are used by All-Terrain Vehicles (ATVs), a use banned under the Conservation Restriction.
- The trail entering the property from the northwest (end of Montgomery Avenue) is regularly abused by ATVs, but is also regularly used by North High School students returning home to their houses in the adjacent neighborhood, or going to baseball practice at Holmes Field.
- Picnic tables, birch tepee and a fire pit are located in the center of property (not easily accessible by trails) and often used by the Ecotarium educational programs.

***Structures:***

There are no structures on the property.

***Known stewardship issues/potential problems:***

a) **ATVs** - Consistent abuse (typically weekly in season) of the conservation property and the adjacent properties, known as Crow Hill and Crow Hill Savannah, by ATVs, creating severe erosion problems on designated hiking trails. ATV users have also created their own trails on erodible soils, causing further erosion.



**Figure 1 Deep ATV tracks on the trails**

b) **Fire suppression & invasive plant species** threaten this black oak savannah ecosystem. Though small to medium-size brush fires have occurred in recent years, over time fire suppression and ecological succession will likely change the savannah to a more mesic and wooded condition. Black oak would cease to regenerate in the shade, and invasive plant species may spread, some of which are already present, such as non-native honeysuckle, multiflora rose, Japanese barberry, Japanese knotweed and autumn olive.



**Figure 2 Encroachment of Japanese Knotweed (7/7/2014)**

c) **Encroachment** - Five of the seven private homeowners along Ebenezer Street who abut the property have significantly encroached upon the CR's property boundaries. The encroachments consist of lawn and garden encroachment, clearing and cutting of vegetation, dumping of yard waste and other debris, and storage of equipment (lawnmower).



**Figure 3 Examples of apparent encroachments**

***Plans for managing known stewardship issues and responsibilities:***

Entity responsible for management: Worcester Conservation Commission (fee holder, primary), GWLT (secondary, a Conservation Restriction holder).

a) **ATVs:**

The City will investigate available enforcement options. Some ideas include a) installing a gate at the terminus of Montgomery Ave to effectively close off to motorized uses a path created by ATV users; currently – three wooden poles have been installed by GWLT as a temporary measure; b) working collaboratively with Police Department to increase enforcement and visual presence; c) increasing signage and possibly increasing penalties for this type of trespassing.



**Figure 4 Terminus of Montgomery Avenue - 3 poles installed as a deterrent to ATVs**

Additionally, the Conservation Restriction allows for the construction, installation, maintenance, repair and replacement of trails and wooded roads for pedestrian use and horseback riding including trail markers and a reasonable number of directional, informational, or admonitory signs no larger than two square feet. GWLT agrees to periodically maintain and clear trails and woods roads to keep them in condition suitable for pedestrian use and horseback riding (including installation of signs).

b) **Fire suppression & invasive plant species:**

i) **Prescribed Burns:**

Given that this is a natural pyrophytic ecosystem, Conservation Commission staff will research applicable laws and regulations for naturally occurring vs. intentional fires.

EcoTarium Savanna Lands Management Study (see **Attachment B**) should be consulted for information with respect to prescribed burns.

Conservation Commission will explore with the Fire Department opportunities for periodic prescribed burns on portions of this site if aligns with the Fire Department's goals and complies with all other applicable laws, rules and regulations. The neighborhood would be kept informed. Weather conditions, air quality standards, local burn policies, cost, liability issues, and availability of qualified fire management personnel all influence when and how a burn is conducted, and thereby, influence oak regeneration success.

ii) Property clearing of vegetative debris using other methods:

In accordance with the best management practices and recommended guidelines set forth in the current Massachusetts Forestry Best Management Practices Manual (Catanzaro, Fish & Kittredge, 2013), or in subsequent editions, the Greater Worcester Land Trust agrees:

- a. to periodically mow or otherwise clear, by pruning, or selectively removing or using an approach mutually agreed upon by the City and the GWLT, portions of the Black Oak Savannah core or supporting habitat in compliance with the Baseline Documentation Report and Land Management Plan;
- b. to prune or selectively remove or remove using alternative methods per approval by the City such trees on other parts of the Premises as may from time to time grow up and block or interfere with the scenic view presently enjoyed by persons standing on the elevated portions of Crow Hill North; and
- c. to periodically maintain and clear trails and woods roads to keep them in condition suitable for pedestrian use and horseback riding (including installation of a limited number of trail markers and directional, informational, or admonitory signs (to be provided by others) no larger than two square feet).

c) **Encroachment:**

- a. Soon after the signing of this document, certified mail letters will be sent to the Ebenezer Street abutters informing them about the Conservation Restriction and the change in ownership, along with a need to cease any unlawful activities or encroachments of the conservation land.
- b. The City will seek funds to survey property boundary along Ebenezer Street and install property boundary monumentation.

***Plans for regular management:***

Trail maintenance, mowing, etc.:

GWLT will:

- i) periodically mow or otherwise clear, by pruning, or selectively removing or using an approach mutually agreed upon by the City and the GWLT, portions of the Black Oak Savannah core or supporting habitat in compliance with the Baseline Documentation Report and Land Management Plan;

- ii) prune or selectively remove or remove using alternative methods per approval by the City such trees on other parts of the Premises as may from time to time grow up and block or interfere with the scenic view presently enjoyed by persons standing on the elevated portions of Crow Hill North; and
- iii) periodically maintain and clear trails and woods roads to keep them in condition suitable for pedestrian use and horseback riding (including installation of a limited number of trail markers and directional, informational, or admonitory signs (to be provided by others) no larger than two square feet).

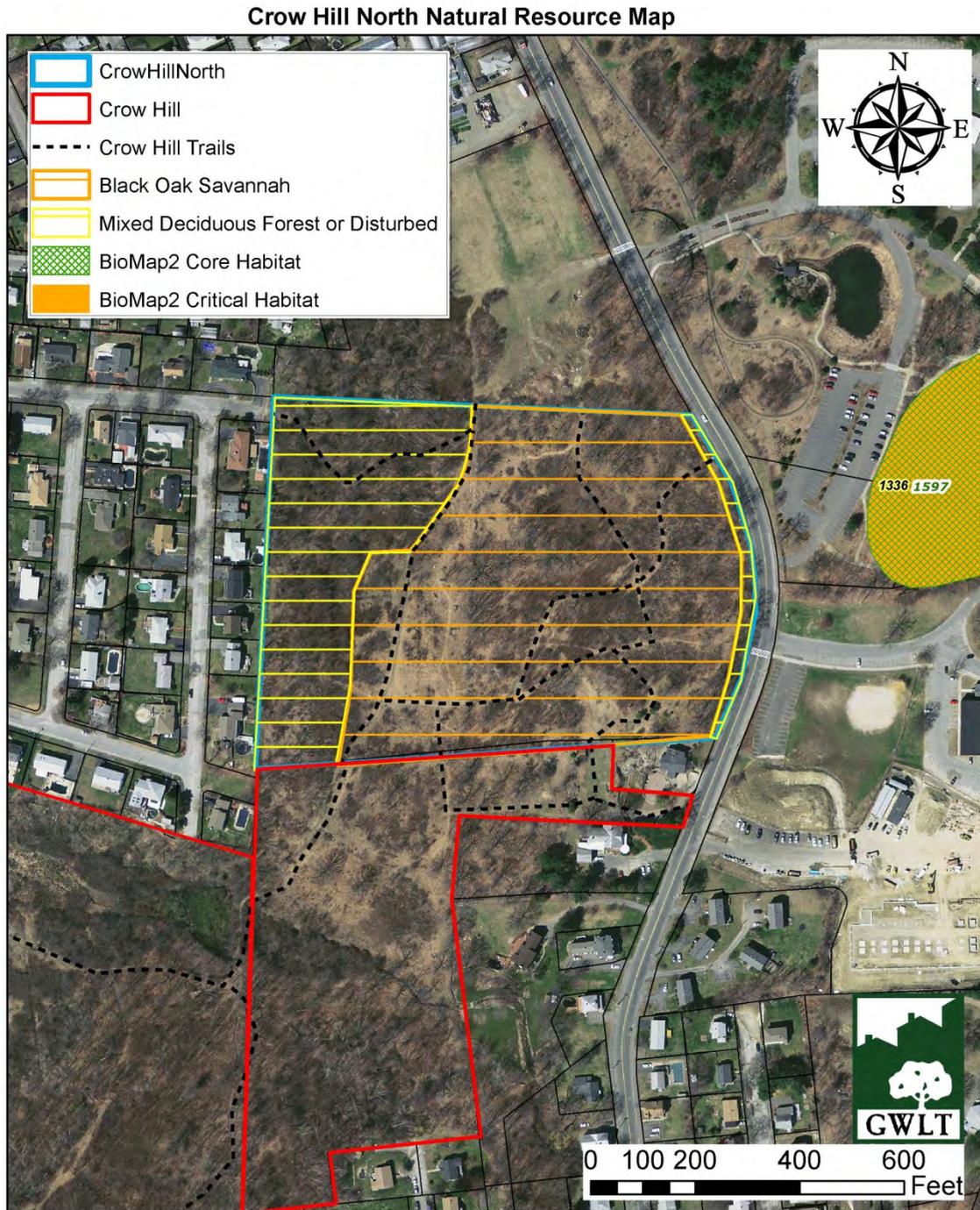
Fence: Conservation Commission will seek funds to remove the chain-link fence running along the southern side lot line of the Crow Hill North bordering Crow Hill Savannah (0 Harrington Way) property also owned by the Commission.

***Active forest management plans:***

Harvesting of saw timber or other forest management will be conducted only in consultation with a licensed forester and following preparation of a Forest Management Plan approved by the Conservation Commission with due consideration of public input for long-term objectives designed to protect the conservation values of the Premises, including without limitation, scenic and wildlife habitat values. Direct oversight is to be provided by the Greater Worcester Land Trust.

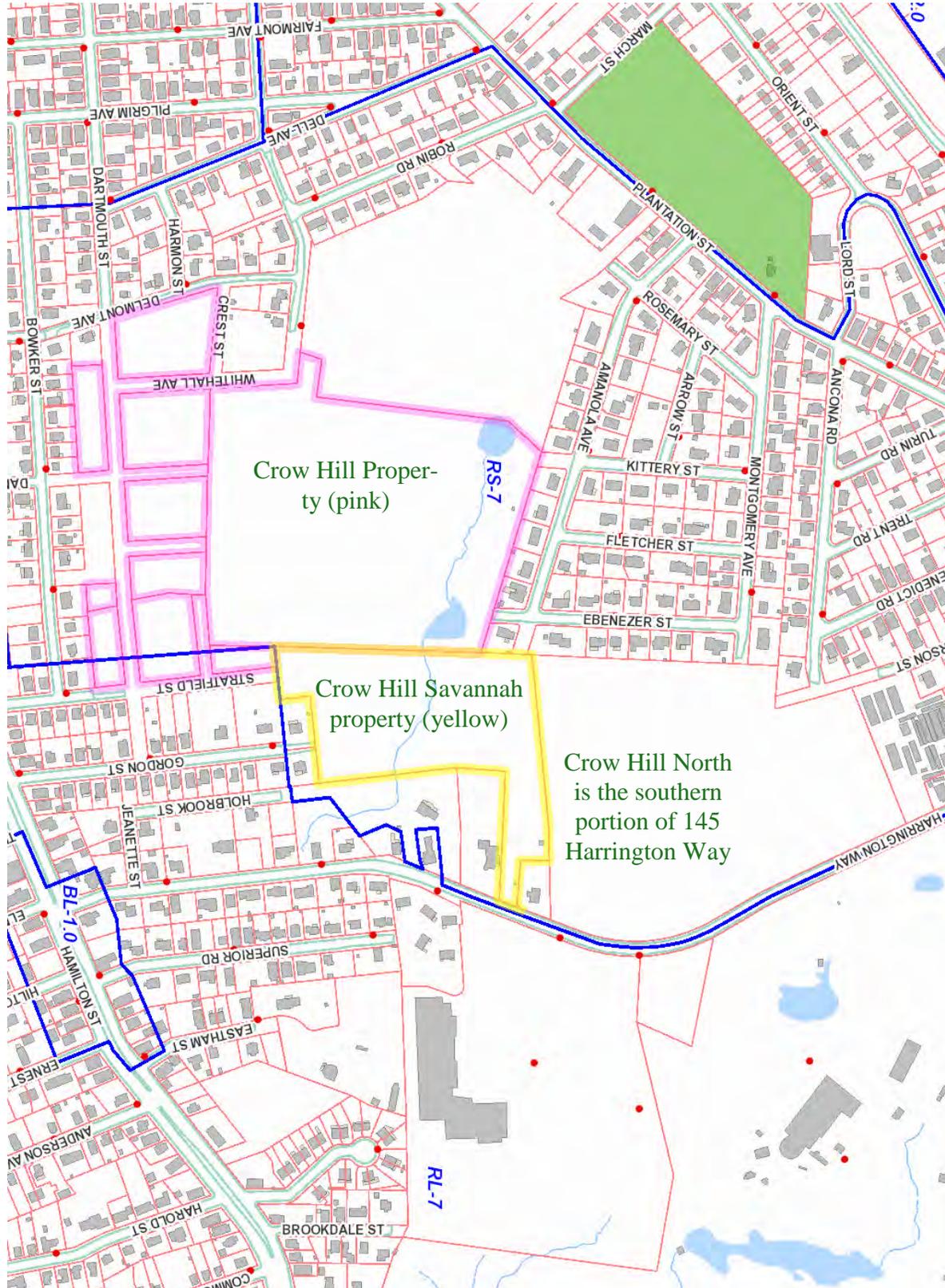
## Section II: Maps

### II.1. Resource map



Aerial photo obtained from MassGIS: <http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/>  
Worcester assessors lines from: <http://www.worcesterma.gov/finance/technical-services/gis>  
Accessed 5/20/14

## II.1.A Context map



## II.2. Monitoring map

Crow Hill North Monitoring Map



Aerial photo obtained from MassGIS: <http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/>  
Worcester assessors lines from: <http://www.worcesterma.gov/finance/technical-services/gis>  
Accessed 5/20/14

## Section III: Site Visit Report

### III.1. General information

**Date of inspection:** 5/12-5/13/14

**Time spent on property:** 4.5 hours

**People present:**

Name:	Affiliation:
Tyler Maikath	Greater Worcester Land Trust

### III.2. Current property conditions

Note: This section may summarize some provisions of the CR or Management Plan. The entire CR document must be read in order to understand its terms.

#### **A. Conditions of the property relevant to the purpose of this project:**

Project purpose	Condition	Photo
Scenic view		
Diversity of habitats	The habitat principally consists of black oak savannah habitat known as Crow Hill North while the rest of the Crow Hill property (not part of this management plan) has a diversity of wetlands and a grassy hilltop dominated by warm-season grasses (drumlin).	3318, 3319, 3325- 3328, 3322, 3323
Black Oak Savannah habitat	Though recent brushfires have helped to keep those areas of the understory largely clear of invasive plant species, a lack of a recent “hot” wildfire and a general practice of fire exclusion by the City’s Fire Dept. has allowed second-growth and fire-intolerant species such as grey birch and aspen, to form thickets.  More problematically from a habitat perspective, disturbed soils on the periphery of the Crow Hill North support dense populations of invasive plant species such as ailanthus, winged euonymus, Norway maple, multiflora rose, etc. In the absence of future combined logging/mowing and wildfire, (and potential herbicide	3318, 3319, 3325- 3328, 3322, 3323

	applications) the invasive species will likely overtake much of the property.	
Recreational Uses	Hiking trails, an educational picnic location used by the Ecotarium.	3313-3317, 3327, 3328, 3320, 3321, 3324

**B. Conditions of the property relevant to Permitted and Prohibited Uses:**

Activity	Condition	Photo
<b>Permitted</b>		
Hiking trails	Most of the hiking trails are being abused by ATVs. Prior to conservation acquisition, ATV users helped to keep the trails open to be used by hikers as there was no active trail maintenance.	3313-3317, 3327, 3328
Educational uses	A recreational picnic and educational spot. Picnic tables, trash barrels, and a grey birch teepee are among the structures at this location.	3320, 3321, 3324
<b>Prohibited</b>		
Dumping	Dumping problems are prevalent behind the houses on Ebenezer St.	3338-3350
Motorized vehicles	The entire trail system shows moderate but consistent ATV use, resulting in trail rutting, erosion, very muddy conditions during and after precipitation events, soil disturbance, and vegetation destruction.	3309, 3311, 3312, 3313, 3314, 3316, 3317
Vegetation destruction	27 Ebenezer has extensively cut shrubs on the property, and cut an illegal path through the woods for the purposes of dumping yard waste. 7-11 Ebenezer St. properties have all cut trees on the Crow Hill North property for firewood, particularly 9 Ebenezer.	3338-3344, 3348, 3349
Chain-link Fence	The chain link fence surrounding the backyard of 33 Ebenezer St. appears to encroach upon the Crow Hill North property by several feet.	3350, 3351

**C. Additional remarks regarding the present condition of the property:**

Japanese knotweed is growing along Harrington Way. Also, much of the north-western wooded corner of the property was disturbed in the past and multiflora rose is very prevalent.

**III.3. Boundary Conditions**

- A. Do the boundaries on the ground clearly correlate to the legal description found in the CR document or property deed (i.e. can you follow the boundary after reading the description)? If not, how did you locate the property boundary?

Yes, corresponds to survey plan of land (except pins on the northern bound line were never installed by surveyors). Boundaries were located principally using the Arc Pad application with the property .shp file uploaded on a Mobile Mapper tablet GPS unit.

- B. (If CR): Are portions of the property which are excluded from the Restriction marked or otherwise evident on the ground?

N/A

- C. Describe the condition of the boundary markings at all other points (i.e. stone wall, flagged, signed, unmarked):

The property lacks any survey monumentation.

The **Northern** boundary of the property is difficult to perceive without technical expertise. The surveyors under contract have thus far failed to deliver on the installation of boundary pins for the Northeast and Northwest corners of the property. An iron pin in the Northwest corner, referenced in a 1973 plan, could not be located.

The **Western** bound line is difficult to perceive due to lack of survey monumentation. A stone wall is intermittently present near the Western bound line, (in other places buried by fill brought in for the houses), but may or may not represent the boundary. (The stonewall is referenced in a 1973 plan (Pl 392, Bk 70), but is not in the deed or the modern plan.)

The **Southwest** corner is also somewhat difficult to locate particularly because of a defunct “paper” street abutting the CR to the southwest.

The **Southeast** corner of the property is defined by the intersection of 2 stonewalls.

I installed 1” PVC pipe (spray-painted red) in the ground at the approximate location of the Northeast, Northwest, and Southwest corners of the CR.

- D. Describe the use of abutting properties, focusing on uses close to the boundary line:

Relatively few abutters for this area.

The abutter along the **northern bound line** (currently Worcester Natural History Society aka Ecotarium) is using the open part (lawn) of their property as overflow parking for the Ecotarium.

The **eastern side of the property** is bordered by Harrington Way.

There is one abutter (private homeowner) along the **southern boundary**, (also an abutter to Crow Hill), who has not been a problem in terms of encroachment.

There are 7 private homeowners **along Ebenezer Street** who abut the CR. Most of them (5 out of 7) have significantly encroached upon the CR's property boundaries. Encroachment activities are documented in the photopoint section, and consist of lawn and garden encroachment, clearing and cutting of vegetation, dumping of yard waste and other debris, and storage of equipment (lawnmower).

E. Any other comments on boundaries?

n/a

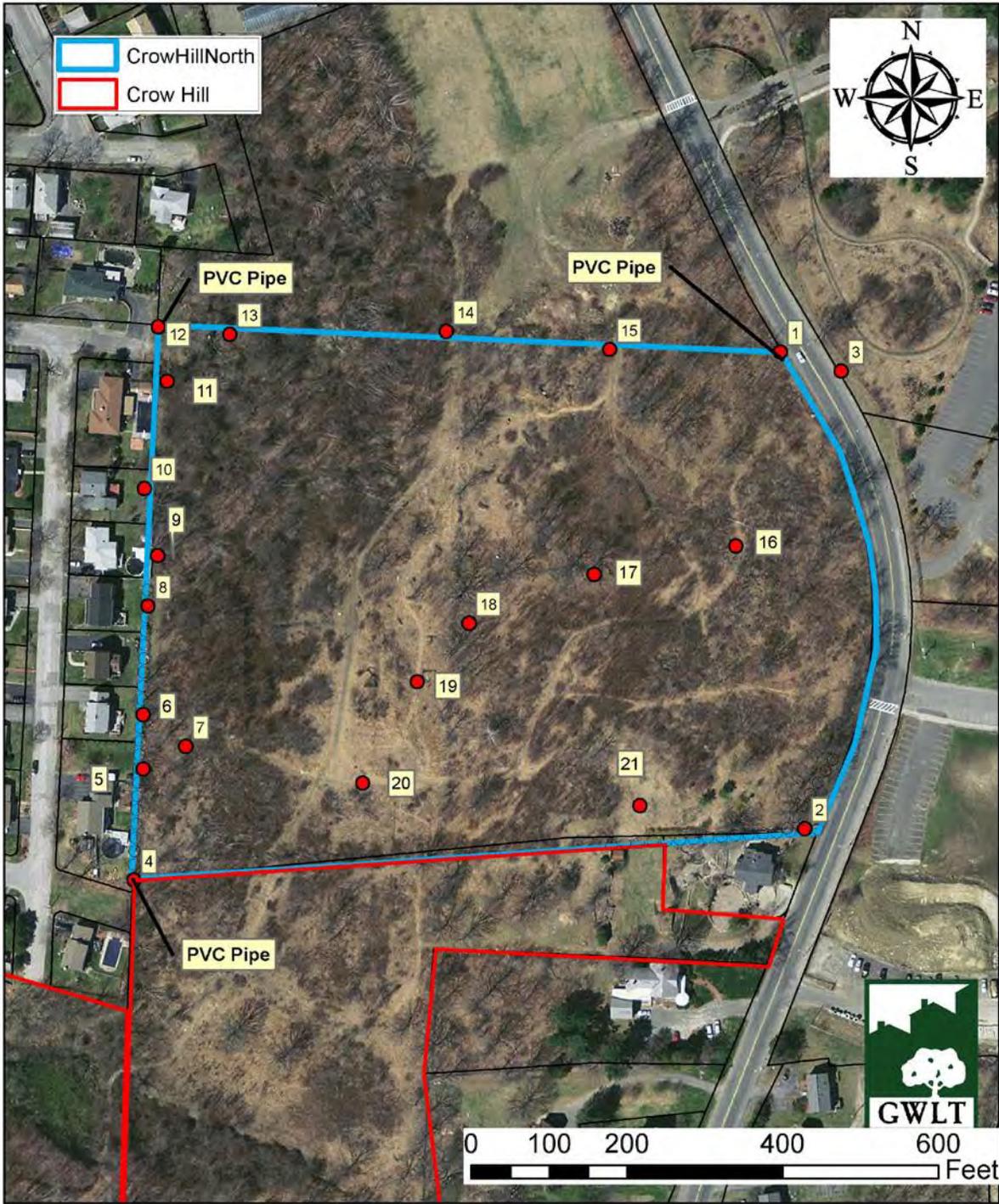
## Section IV: Photographs

### IV.1. Photo location map

The **photo location map** shows the location from which documentary photographs were taken. Include:

- **Property boundary** (and CR boundary if applicable).
- **Photopoints** (location from which photos were taken). Each point should be placed as accurately as possible. Mark each point with:
  - An arrow showing the direction the photo was facing
  - A label (A,B,C or 1,2,3 etc.) so that the description can be looked up in the list of photos

### Crow Hill North Photopoint Map



Aerial photo obtained from MassGIS: <http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/>  
Worcester assessors lines from: <http://www.worcesterma.gov/finance/technical-services/gis>  
Accessed 5/20/14



### IV.3. Documentary Photographs

All photos by Tyler Maikath 5/12-5/13/14 with a Sony Cybershot 10.1 mp digital camera. All azimuths are magnetic.



Photopoint 1.1; JPEG 3354; Azimuth: 226; Date: 5/13/14; Monument: PVC marker installed. Northwesterly view out of the CR along Harrington Way from the northeastern corner. CR is to the left.



Photopoint 1.2; JPEG 3355; Azimuth: 46; Date: 5/13/14; Monument: PVC marker installed. Southeasterly view along the eastern CR boundary. CR is to the right.



Photopoint 1.3; JPEG 3356; Azimuth: 78; Date: 5/13/14; Monument: PVC marker installed. Easterly view out of CR across Harrington Way towards the Ecotarium property. CR is to the right and behind the photographer.



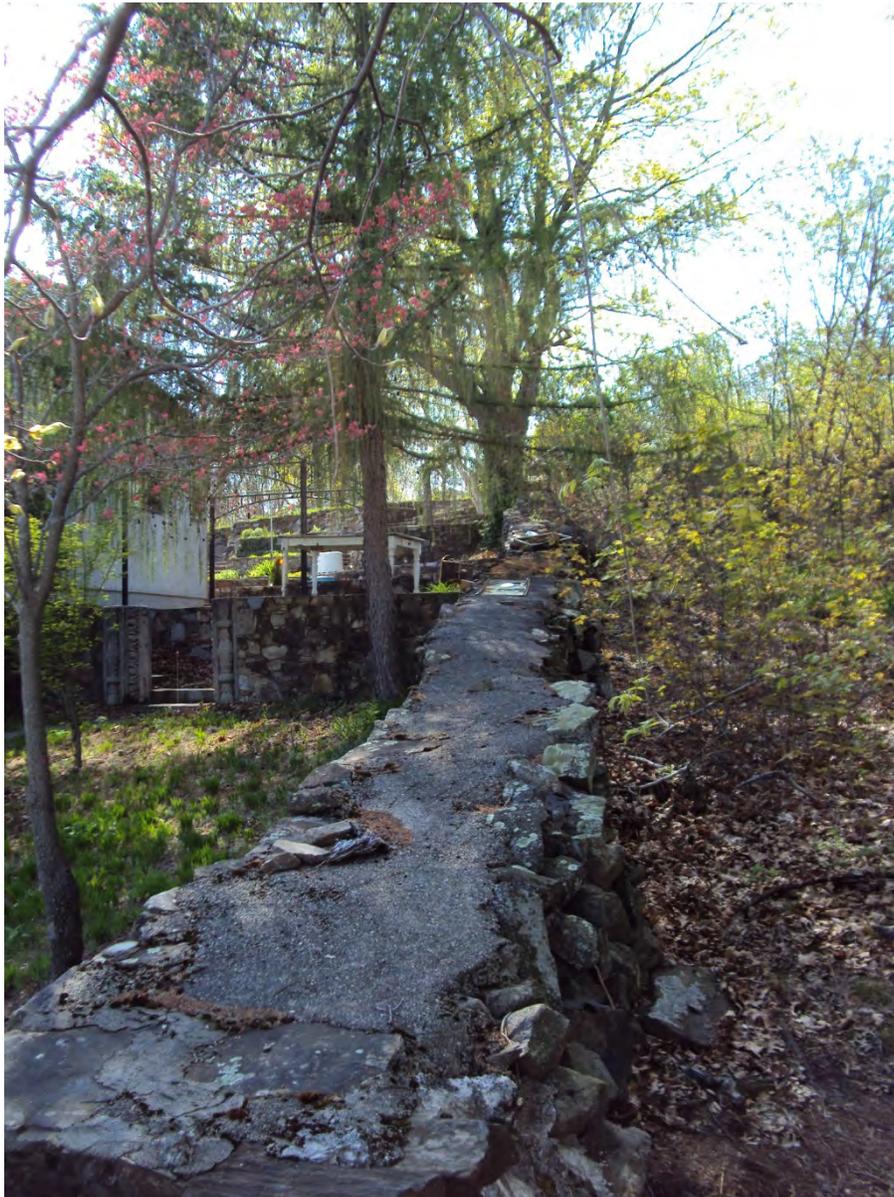
Photopoint 1.4; JPEG 3357; Azimuth: N/A; Date: 5/13/14; Monument: PVC marker installed. PVC marker at the northeastern corner of the CR.



Photopoint 1.5; JPEG 3358; Azimuth: 273; Date: 5/13/14; Monument: PVC marker installed. Westerly view along the northern boundary of the CR from the northeastern corner. CR is to the left.



Photopoint 2.1; JPEG 3329; Azimuth: 98; Date: 5/12/14; Monument: Intersection of 2 stonewalls & a chain link fence. Easterly view from southern boundary of the CR to southeastern corner and across Harrington Way out of CR. CR is to the left.



Photopoint 2.2; JPEG 3330; Azimuth: 298; Date: 5/12/14; Monument: Intersection of 2 stonewalls & a chain link fence. Westerly view along southern boundary of the CR. CR is to the right of stonewall.



Photopoint 2.3; JPEG 3331; Azimuth: 28; Date: 5/12/14; Monument: Intersection of 2 stonewalls & a chain link fence. Northerly view along the eastern boundary of the CR. CR is to the left.



Photopoint 3.1; JPEG 3332; Azimuth: 192; Date: 5/12/14; Monument: Worcester Highway Bound. Southerly view of CR from across Harrington Way. North High is in the background on the left. CR is to the right of the street.



Photopoint 3.2; JPEG 3333; Azimuth: N/A; Date: 5/12/14; Monument: Worcester Highway Bound. Across Harrington Way from the CR.



Photopoint 4.1; JPEG 3351; Azimuth: 17; Date: 5/13/14; Monument: PVC marker installed. Northerly view from southwestern corner of the CR, shows fence from 33 Ebenezer St. is most likely partially encroaching on the CR. CR is to the right.



Photopoint: 4.2; JPEG 3352; Azimuth: 182; Date: 5/13/14; Monument: PVC marker installed. Southerly view out of the CR from the southwestern corner of the CR. CR is behind the photographer.



Photopoint 4.3; JPEG 3353; Azimuth: N/A; Date: 5/13/14; Monument: PVC marker installed. PVC marker at the southwestern corner of the CR.



Photopoint 5.1; JPEG 3350; Azimuth: 197; Date: 5/13/14; Monument: None. Southerly view along the western boundary of the CR showing building rubble encroaching upon the CR from 33 Ebenezer St. Note: Fence may also partially be on the CR. CR is to the left.



Photopoint 6.1; JPEG 3348; Azimuth: East; Date: 5/13/14; Monument: Stonewall. Easterly view into the CR from western boundary showing vegetation cutting encroachment.



Photopoint 6.2; JPEG 3349; Azimuth: East; Date: 5/13/14; Monument: Stonewall. Southeasterly view into the CR from western boundary showing vegetation cutting encroachment.



Photopoint 7.1; JPEG 3347; Azimuth: 162; Date: 5/13/14; Monument: None. Southerly view within CR of grass clipping and other yard waste dumping, encroaching upon the CR from 27 Ebenezer St.



Photopoint 8.1; JPEG 3344; Azimuth: 17; Date: 5/13/14; Monument: Stonewall. Northerly view along the western boundary of the CR. CR is to the right.



Photopoint 8.2; JPEG 3345; Azimuth: 197; Date: 5/13/14; Monument: Stonewall. Southerly view along the western boundary of the CR. CR is to the left. Note patio chairs and other debris encroaching on the CR.



Photopoint 8.3; JPEG 3346; Azimuth: 118; Date: 5/13/14; Monument: Stonewall. Easterly view into the CR from the western boundary showing plywood, chairs, and a table encroaching upon the CR.



Photopoint 9.1; JPEG 3342; Azimuth: 182; Date: 5/13/14; Monument: None. Southerly view along the western boundary of the CR from behind 9 Ebenezer St. showing clearing and dumping encroachment on the CR.



Photopoint 9.2; JPEG 3343; Azimuth: East; Date: 5/13/14; Monument: None. Easterly view into the CR from the western boundary behind 9 Ebenezer St. showing clearing and firewood piled up on the CR.



Photopoint 10.1; JPEG 3339; Azimuth: 116; Date: 5/13/14; Monument: None. Southeasterly view into CR from western boundary behind 7 Ebenezer St. showing clearing and lawn encroachment.



Photopoint 10.2; JPEG 3340; Azimuth: 80; Date: 5/13/14; Monument: None. Easterly view into the CR from the western boundary behind 7 Ebenezer St. showing brush dumping and firewood pile encroachment.



Photopoint 10.3; JPEG 3341; Azimuth: 162; Date: 5/13/14; Monument: None. Southerly view into CR from the western boundary behind 7 Ebenezer St. showing lawn, chimney, lawnmower, brush piles, and compost pile encroachment (from 9 Ebenezer?).



Photopoint 11.1; JPEG 3338; Azimuth: East; Date: 5/13/14; Monument: None. Stump dump from 1 Ebenezer St. partially onto CR.



Photopoint 12.1; JPEG 3334; Azimuth: 182; Date: 5/13/14; Monument: PVC marker installed. Southerly view along the western boundary of the CR from the northwestern corner. CR is to the left.



Photopoint 12.2; JPEG 3335; Azimuth: N/A; Date: 5/13/14; Monument: PVC marker installed. At the northwestern corner of the CR.



Photopoint 12.3; JPEG 3336; Azimuth: 93; Date: 5/13/14; Monument: PVC marker installed. Easterly view along the northern boundary of the CR. CR is to the right.



Photopoint 12.4; JPEG 3337; Azimuth: 290; Date: 5/13/14; Monument: PVC marker installed. Westerly view out of CR towards Montgomery Ave. from the northwestern corner.



Photopoint 13.1; JPEG 3309; Azimuth: 130; Date: 5/12/14; Monument: None. Southeasterly view into CR showing illegal ATV trail at the eastern terminus of Montgomery Ave.



Photopoint 13.2; JPEG 3311; Azimuth: 93; Date: 5/12/14; Monument: None. Easterly view along the northern boundary of the CR from illegal ATV trail entrance. CR is to the right.



Photopoint 13.3; JPEG 3312; Azimuth: 273; Date: 5/12/14; Monument: None. Westerly view along the northern boundary of the CR from illegal ATV trail entrance. CR is to the left.



Photopoint 14.1; JPEG 3313; Azimuth: 60; Date: 5/12/14; Monument: None. Northeasterly view out of CR from the northern boundary of the CR showing hiking trail.



Photopoint 14.2; JPEG 3314; Azimuth: 198; Date: 5/12/14; Monument: None. Southerly view from the northern boundary of the CR showing hiking trail and trail rutting caused by ATVs. Ruts are 6-12" deep.



Photopoint 15.1; JPEG 3315; Azimuth: 356; Date: 5/12/14; Monument: None. Northerly view out of the CR from the northern boundary of the CR showing another hiking trail.



Photopoint 15.2; JPEG 3316; Azimuth: 197; Date: 5/12/14; Monument: None. Southerly view into the CR from the northern boundary of the CR showing hiking trail.



Photopoint 16.1; JPEG 3317; Azimuth: South. Date: 5/12/14; Monument: None. Southerly view along hiking trail showing deep rutting and resource damage caused by illegal ATV riding within CR.



Photopoint 17.1; JPEG 3318; Azimuth: West. Date: 5/12/14; Monument: None. Westerly view within CR of typical habitat with oaks and groves of grey birch and aspen.



Photopoint: 17.2; JPEG 3319; Azimuth: South. Date: 5/12/14; Monument: None. Southerly view within CR of typical habitat with oaks and groves of grey birch and aspen.



Photopoint 18.1; JPEG 3320; Azimuth: East. Date: 5/12/14; Monument: None. View of birch teepee and apparent fire pit at a recreational picnic and educational spot used by the Ecotarium within CR.



Photopoint: 18.2; JPEG 3321; Azimuth: South; Date: 5/12/14; Monument: None. View of picnic tables and trash cans at a recreational picnic and educational spot used by the Ecotarium within CR.



Phototpoint: 18.3; JPEG 3322; Azimuth: North; Date: 5/12/14; Monument: None. View of black oaks heavy with pollen at picnic location within CR.



Photopoint 18.4; JPEG 3323; Azimuth: Northwest; Date: 5/12/14; Monument: None. View of black oak heavy with pollen within CR.



Photopoint 18.5; JPEG 3324; Azimuth: N/A; Date: 5/12/14; Monument: None. View of Ecotarium signs on the side of a trail near the picnic location within the CR.



Photopoint 19.1; JPEG 3325; Azimuth: East. Date: 5/12/14; Monument: None. View east of wildfire evidence within the CR.



Photopoint 20.1; JPEG 3326; Azimuth: North; Date: 5/12/14; Monument: None. View north of meadow within the CR.



Photopoint 20.2; JPEG 3327; Azimuth: North; Date: 5/12/14; Monument: None. View north of meadow and hiking trail on CR.



Photopoint 21.1; JPEG 3328; Azimuth: North; Date: 5/12/14; Monument: None. View of open ledge on a hiking trail within the CR.

## **Section V:** **Amendments**

### **V. 1. How to amend this document**

This property is permanently protected as open space for conservation and passive recreational use only. Property acquired with LAND grant funding may not be used for active recreation.

It is difficult to anticipate all potential changes to the property that may occur, due to natural events, that may make it more or less appropriate for specific activities or uses. It is also difficult to know in the present the specific passive recreational uses future visitors to the site may want. For these reasons, it may become necessary in the future for portions of the Land Management Plan to be revised. Amendments to this Plan may be proposed by any party. Any amendment proposals shall be reviewed and considered by the Conservation Commission. If approved, as amended, the amendment document shall be endorsed by the Commission and placed on file.

The following sections of this document may be revised:

I.4. Contact information

I.5. Land Management Plan sections:

Permitted uses/activities

Prohibited uses/activities

Structures

Stewardship plans

Active management plans

Any changes to these sections must still adhere to the LAND grant program regulations, Project Agreement, Article 97 requirements, and any other pertinent regulations. All changes must adhere to the terms of the Conservation Restriction.

**Section VI:**  
**Signatures**

I certify that the above Baseline Documentation Report and Land Management Plan is accurate and complete.

I understand that this property is permanently protected open space under Article 97 of the Massachusetts Constitution, for conservation and passive recreation uses, under the care and control of the Conservation Commission. I understand that the property may not be sold, subdivided, altered, or used for any other purposes, except by all of the following: approval of the Conservation Commission; approval of the municipality by town meeting/city council vote; vote of approval by both houses of the Massachusetts State Legislature; approval by the Governor of Massachusetts; mitigation by replacement with an unprotected property of equal or greater size, value at the time of disposition, ecological value, and passive recreational value, subject to approval by the Secretary of Energy and Environmental Affairs. Any change in use must also adhere to all relevant environmental laws and regulations, including but not limited to the Massachusetts Environmental Protection Act and Endangered Species Protection Act, the Wetlands Protection Act, the Rivers Protection Act, and Global Warming Solutions Act.



Preparer

Colin Novick  
LUBA ZHAUROVA

Print name

Municipal Chief Executive Officer

Print name

  
Conservation Commissioner

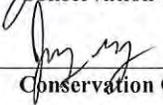
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8/25/2014

Date

**Attachment A – Conservation Restriction held by  
Greater Worcester Land Trust (Book 53193, Page 93)**



2014 00121706

Bk: 53193 Pg: 93

Page: 1 of 18 12/23/2014 12:51 PM WD

**Grantor:** City of Worcester  
**Grantee:** Greater Worcester Land Trust, Inc.  
**Property address:** Southern Portion of 145 Harrington Way, Worcester, Massachusetts  
**Title Reference:** Book 52476, Page 346.

### CONSERVATION RESTRICTION

The City of Worcester, with an address of 455 Main Street, Worcester, Massachusetts, together with its successors and assigns ("Grantor"), acting pursuant to Sections 31, 32, and 33 of Chapter 184 of the Massachusetts General Laws, and for consideration of \$141,000.00, hereby grants, with quitclaim covenants, to Greater Worcester Land Trust, Inc., a Massachusetts non-profit corporation with an office at 4 Ash Street, Worcester, Massachusetts, its successors and permitted assigns ("Grantee") in perpetuity and exclusively for conservation purposes, a conservation restriction having the terms and conditions hereinafter set forth (the "Conservation Restriction") on certain land located in the city of Worcester, Worcester County, Massachusetts, containing approximately 13.7 acres, more or less, said land being more particularly described in Exhibit A attached hereto (the "Premises") and shown on the sketch attached as Exhibit B and hereinafter referred to as Crow Hill North. For Grantor's title, see the deed recorded in the Worcester District Registry of Deeds, Book 52476, Page 346. The parties intend to amend this Conservation Restriction in the future so as to add to it the lands of the Grantor described in said Registry, Book 22687, Page 202 and Book 43925, Page 206 after authorization to do so by the legislature under Article 97 of the Amendments to the Constitution of the Commonwealth of Massachusetts.

#### I. PURPOSES.

This Conservation Restriction is defined in and authorized by Sections 31-33 of Chapter 184 of the General Laws and otherwise by law. Its purpose is to assure that the Premises will be retained in perpetuity and for conservation purposes in their present natural, scenic and open condition; to prevent any use of the Premises that would materially impair or interfere with the conservation values thereof; and to further the conservation purposes of the L.A.N.D. Grant Program of the Massachusetts Executive Office of Energy and Environmental Affairs, which is providing funding to assist in protection of the Premises. The conservation and permanent protection of the Premises will yield a significant public benefit by promoting the following conservation interests:

- A. The Premises provide open space for public enjoyment, and will be open to the general public for educational purposes, hiking, birdwatching, passive outdoor recreation, and similar uses;
- B. The Premises provide a relatively natural area offering a diversity of habitat for plants and animals;
- C. There is a scenic view of Worcester, worthy of being preserved and made available to the public, from the elevated portions of Crow Hill North on the Premises. This

Conservation Restriction provides that this view be kept open by mowing, pruning and tree removal, and that the general public have access to the Premises in order to enjoy the view;

D. Preservation of the Premises, by prohibiting alterations to the natural character thereof, will protect the area's scenic and open space value and enhance the passive recreational, human enjoyment, and ecological value of this conservation open space;

E. Preservation of the natural landscape including a complex of geology and natural communities of drumlin, granite outcrop, wetland system, and pyrophytic (fire-loving) Black Oak Savannah habitat that are distinctly and uniquely Worcester;

F. Contributing to the overall ecological health of the Fitzgerald Brook, for which the Premises serve as a source water; the Fitzgerald Brook is a tributary of Lake Quinsigamond;

G. Promoting environmental education of the City's natural resources by providing a readily accessible educational resource to the adjacent North High School, a Worcester public school, and the non-profit Worcester Natural History Society currently doing business as EcoTarium; and

H. Addressing a stated governmental public policy goal by preserving one of Worcester's "Top Ten" open space areas, as officially identified and adopted in 1987 by the Worcester City Council.

I. The Premises are conserved through the Commonwealth of Massachusetts Executive Office of Energy & Environmental Affairs - Division of Conservation Services, 2013 Local Acquisitions for Natural Diversity (LAND) Grant, pursuant to LAND (Self-Help) Act, Massachusetts General Laws, Chapter 132A, Section 11. The LAND Project Agreement for this property was recorded in Book 52493 Page 340 with the Worcester District Registry of Deeds.

## II. ACTS AND USES PROHIBITED OR PERMITTED.

A. Prohibited Acts and Uses. Except as otherwise provided herein, the Grantor will neither perform nor permit the following acts and uses which are prohibited on, above, and below the Premises:

1. Constructing, placing or allowing to remain any temporary or permanent building, tennis court, landing strip, mobile home, swimming pool, asphalt or concrete pavement, sign, fence, billboard or other advertising display, antenna, utility pole, tower, conduit, line or other temporary or permanent structure or facility on, above or under the Premises;

2. Mining, excavating, dredging or removing from the Premises of soil, loam, peat, gravel, sand, rock or other mineral resource or natural deposit or otherwise making topographical changes to the Premises;

3. Placing, filling, storing or dumping on the Premises of soil, refuse, trash, vehicle bodies or parts, rubbish, debris, junk, waste or other substance or material whatsoever or the installation of underground storage tanks;
4. Cutting, removing or otherwise destroying trees, grasses or other vegetation;
5. Activities detrimental to drainage, flood control, water conservation, water quality, wildlife habitat, erosion control, soil conservation, scenic views, or archaeological conservation;
6. Use, parking or storage of motor vehicles including motorcycles, mopeds, all-terrain vehicles, motorized trail bikes, or any other motorized vehicles on the Premises except as necessary in emergencies or by police, firefighters or other governmental agents in carrying out their lawful duties;
7. Division or subdivision of the Premises or conveyance of a part or portion of the Premises alone (as compared to conveyance of the Premises in its entirety which shall be permitted), except with the prior written consent of the Grantee;
8. Use of any portion of the Premises to satisfy regulatory requirements with respect to construction or development on the Premises or any other land;
9. Commercial recreational activities;
10. Any other use of the Premises or activity thereon which materially impairs the purposes of this Conservation Restriction or other significant conservation interests unless necessary in an emergency for the protection of the conservation interests that are the subject of this Conservation Restriction.

B. Reserved Rights and Exceptions. Notwithstanding the provisions of paragraph A, the following activities and uses (together with all uses and activities not explicitly prohibited by paragraph A) are permitted, but only if they do not materially impair the purposes of this Conservation Restriction or other significant conservation interests:

1. The mowing of fields and meadows;
2. In accordance with the best management practices and recommended guidelines set forth in the current Massachusetts Forestry Best Management Practices Manual (Catanzaro, Fish & Kittredge, 2013), or in subsequent editions thereof if approved by the Grantee, or in such other manual or description of best management practices as the Grantee may approve from time to time,
  - a. selective pruning and cutting for the following purposes: to improve wildlife habitat; to mark boundaries; to prevent, control or remove hazards, disease, or damage from insects, storm, or fire; to control or remove invasive or exotic species; to clear around and near stone walls;

and to maintain the scenic view from the elevated portions of Crow Hill North; and

- b. at least one hundred feet from watercourses and wetlands and in accordance with all applicable statutes and regulations including any plans required thereunder, the cutting of trees for any purpose, including without limitation commercial timber production, in accordance with a sustainable forest management plan, prepared by a Massachusetts licensed professional forester and approved by the Grantee, that is designed to protect the conservation values of the Premises, including without limitation, scenic and wildlife habitat values;
3. The construction, installation, maintenance, repair and replacement of:
    - a. trails and woods roads for pedestrian use and horseback riding (including trail markers and a reasonable number of directional, informational, or admonitory signs no larger than two square feet) or as reasonably necessary for the uses herein permitted;
    - b. gates, stone walls, and sight-pervious fencing, provided that existing stone walls will remain in their present location and condition; and
    - c. boundary markers and a reasonable number of signs no larger than two (2) square feet, except at the property access points whereas the sign/s can be no larger than ten (10) square feet, indicating the status of the land as a conservation area, any restrictions on its use, the Grantee's interest in the Premises, and the conservation values protected by this Conservation Restriction;
  4. Non-commercial recreational activities by the general public such as hiking, cross-country skiing, horseback riding, nature study, including the erection and use of such accessory structures as blinds and birdhouses, and other non-motorized outdoor recreational activities that do not materially alter the landscape, and do not degrade environmental quality;
  5. Following written notice to Grantee, measures designed to restore native biotic communities, or to maintain, enhance or restore wildlife, wildlife habitat, or rare or endangered species.
  6. The conduct of archaeological activities, including without limitation survey, excavation and artifact retrieval, following submission of an archaeological field investigation plan and its approval in writing by Grantee and by the State Archeologist of the Massachusetts Historical Commission (or appropriate successor official); and

7. The use (but not the storage) of motor vehicles in accordance with uses permitted under paragraphs B.1 or B.2 above, or as permitted by the Grantee in connection with the other rights reserved in this paragraph B.

The exercise of any right reserved by Grantor under this Paragraph B shall be in compliance with zoning, the Wetlands Protection Act, and all other applicable federal, state and local laws, rules, regulations, and permits. The inclusion of any reserved right requiring a permit from a public agency does not imply that the Grantee or the Commonwealth takes any position as to whether such permit should be issued.

C. Archeological and Historic Resources.

New construction, demolition, or rehabilitation, and any other activity in support of permitted uses and reserved rights, such as but not limited to earth moving, and the alteration of historic stone walls, cellar holes and other features, that proposes disturbance to the surface or subsurface of the ground, shall require prior consultation with the Massachusetts Historical Commission (or appropriate successor official) to prepare a protocol and implement procedures to identify, evaluate, and adopt feasible alternatives to avoid, minimize, or mitigate any adverse effects to historic and archaeological assets.

An activity shall not be deemed to be detrimental to archeological and historic resources if a description of the proposed activity and its location is submitted in writing with a plan of land (or assessors map) and a USGS map with the Premises outlined thereon, to Massachusetts Historic Commission ("MHC") and MHC issues a letter stating that the proposed activity is not within a resource area or is determined to not have an adverse effect on said resources.

Grantor and Grantee shall make every reasonable effort to prohibit any person from conducting archaeological field investigation including metal detecting, digging, or artifact collecting without approval of the State Archaeologist of the Massachusetts Historical Commission (or appropriate successor official), and shall promptly report any such prohibited activity to the State Archaeologist of the Massachusetts Historical Commission (or appropriate successor official). Grantor and Grantee shall include the prohibition against digging, artifact collecting, or metal detecting in any list of rules for visitors to the Premises.

D. Notice and Approval. Whenever notice to or approval by Grantee is required under the provisions of paragraphs A or B, or whenever Grantor intends to undertake any activity that may have an adverse effect on the purposes of this Conservation Restriction, Grantor shall notify Grantee in writing not less than 60 days prior to the date Grantor intends to undertake the activity in question. The notice shall describe the nature, scope, design, location, timetable and any other material aspect of the proposed activity in sufficient detail to permit the Grantee to make an informed judgment as to its consistency with the purposes of this Conservation Restriction. Where Grantee's approval is required, Grantee shall grant or withhold approval in writing within 60 days of receipt of said notice. Grantee's approval shall not be unreasonably withheld, but shall only be granted upon a showing that the proposed activity will not materially impair the purposes of this Conservation Restriction. Failure of Grantee to respond in writing within 60 days shall be deemed to constitute approval by Grantee of the activity described in the notice, so

long as the notice sets forth the provisions of this section relating to deemed approval after 60 days, the requested activity is not prohibited hereunder, and the activity will not materially impair the purposes of this Conservation Restriction or the conservation values of the Premises.

E. Obligations of Grantee. The Grantee covenants and agrees

1. to periodically mow or otherwise clear, by pruning, or selectively removing or using an approach mutually agreed upon by the Grantor and Grantee, portions of the Black Oak Savannah core or supporting habitat in compliance with the Baseline Documentation Report and Land Management Plan;
2. to prune or selectively remove or remove using alternative methods per approval by the Grantor such trees on other parts of the Premises as may from time to time grow up and block or interfere with the scenic view presently enjoyed by persons standing on the elevated portions of Crow Hill North; and
3. to periodically maintain and clear trails and woods roads to keep them in condition suitable for pedestrian use and horseback riding (including installation of a limited number of trail markers and directional, informational, or admonitory signs (to be provided by others) no larger than two square feet.

III. LEGAL REMEDIES OF THE GRANTEE.

A. Legal and Injunctive Relief. The rights hereby granted shall include the right to enforce this Conservation Restriction by appropriate legal proceedings and to obtain injunctive and other equitable relief against any violations, including, without limitation, relief requiring restoration of the Premises to their condition prior to the time of the injury complained of (it being agreed that the Grantee will have no adequate remedy at law). The rights hereby granted shall be in addition to, and not in limitation of, any other rights and remedies available to the Grantee for the enforcement of this Conservation Restriction. Grantor covenants and agrees to reimburse to Grantee all reasonable costs and expenses (including reasonable counsel fees) incurred in enforcing this Conservation Restriction or in taking reasonable measures to remedy, abate or correct any violation thereof, provided that a violation of this Conservation Restriction is acknowledged by Grantor or determined by a court of competent jurisdiction to have occurred.

B. Non-Waiver. Enforcement of the terms of this Conservation Restriction shall be at the discretion of Grantee. Any election by the Grantee as to the manner and timing of its right to enforce this Conservation Restriction or otherwise exercise its rights hereunder shall not be deemed or construed to be a waiver of such rights.

C. Disclaimer of Liability. By its acceptance of this Conservation Restriction, the Grantee does not undertake any liability or obligation relating to any condition of the Premises not caused by Grantee or its agents, including with respect to compliance with hazardous materials or other environmental laws and regulations.

D. Acts Beyond the Grantor's Control. Nothing contained in this Conservation Restriction shall be construed to entitle Grantee to bring any action against the Grantor for any

injury to or change in the Premises resulting from causes beyond the Grantor's control, including, but not limited to, fire, flood, storm, and earth movement, or from any prudent action taken by the Grantor under emergency conditions to prevent, abate, or mitigate significant injury to the Premises resulting from such causes. After any injury to the Premises resulting from such causes, the parties shall cooperate in attempting to restore the Premises to their condition prior to such injury if such restoration is feasible and would promote the conservation purposes of this Conservation Restriction.

E. Trespass. It shall be a violation of this Conservation Restriction for any trespasser or other third party to take any action that would violate this Conservation Restriction if taken by the Grantor or that would materially impair the purposes of this Conservation Restriction or other significant conservation interests. The Grantor shall make all reasonable efforts to prevent trespassers or other third parties from violating this Conservation Restriction. The Grantee shall also have the right to enforce this Conservation Restriction against trespassers or other third parties, but this shall not in any way diminish the rights of the Grantor with respect thereto or the Grantor's obligations under the preceding sentence, nor shall it create any obligation on the part of the Grantee. If the Grantor is unable to prevent trespassers or other third parties from violating or continuing to violate this Conservation Restriction, or if the Grantor becomes aware of damage caused by trespassers or other third parties to the conservation interests protected by this Conservation Restriction, then the Grantor shall promptly notify the Grantee, and if so requested, shall co-operate with any efforts of the Grantee to prevent such violations or to restore the Premises to their condition prior to such damage. The Grantor shall in any event so restore the Premises. At such time as title to the Premises is sold or otherwise transferred, the new owner may be held responsible for so restoring the Premises.

#### IV. ACCESS.

A. No Implied Right of Access. The Conservation Restriction hereby conveyed does not grant to the Grantee, to the public generally, or to any other person any right to enter upon the Premises except as explicitly provided in paragraph IV.B.

B. Grant of Right of Access. The Grantor hereby grants

1. to the Grantee and its representatives the right to enter the Premises
  - a. at reasonable times, with reasonable notice and in a reasonable manner for the purpose of inspecting the Premises to determine compliance herewith (and the Grantor agrees that if the determination of such compliance ever depends on a bona fide question as to the exact location of any boundary or boundaries of the Premises, the Grantor shall engage an independent surveyor acceptable to the Grantee to establish and permanently mark the location of such boundary or boundaries);
  - b. after thirty (30) days prior written notice, to take any and all actions with respect to the Premises which may be necessary or appropriate, with or without order of court, to remedy, abate or otherwise enforce any violation hereof;

c. at reasonable times, with reasonable notice and in a reasonable manner to construct, install, maintain, repair, and replace boundary markers and a reasonable number of signs no larger than two (2) square feet indicating the status of the land as a conservation area and any restrictions on its use; and

d. at reasonable times, with reasonable notice and in a reasonable manner for the purpose of

(1) periodically mowing or otherwise clearing, by pruning, or selectively removing or using an approach mutually agreed upon by the Grantor and Grantee, portions of the Black Oak Savannah core or supporting habitat in compliance with the Baseline Documentation Report and Land Management Plan;

(2) pruning or selectively removing or removing using alternative methods per approval by the Grantor such trees on other parts of the Premises as may from time to time grow up and block or interfere with the scenic view presently enjoyed by persons standing on the elevated portions of Crow Hill North; and

(3) periodically maintaining and clearing trails and woods roads to keep them in condition suitable for pedestrian use and horseback riding (including installation of a limited number of trail markers and directional, informational, or admonitory signs (to be provided by others) no larger than two square feet.

2. to the general public the right to pass and repass on foot over and throughout the Premises during daylight hours for purposes of hiking, nature study, and similar non-motorized recreational activities compatible with retention of the Premises predominantly in their natural, scenic and open condition, subject, however, to such reasonable rules as the Grantor, in consultation with the Grantee, may establish and amend from time to time.

## V. EXTINGUISHMENT.

A. Judicial Termination. If circumstances arise in the future such as render the purpose of this Conservation Restriction impossible to accomplish, this restriction can only be terminated or extinguished, whether in whole or in part, by a court of competent jurisdiction under applicable law with notice to and approval by the Secretary of the Executive Office of Energy and Environmental Affairs of the Commonwealth of Massachusetts. The parties agree that if any change in conditions ever gives rise to extinguishment or other release of the Conservation Restriction under applicable law, then Grantee shall be entitled to half of the proceeds of any subsequent sale, exchange, or involuntary conversion of the Premises, subject, however, to the requirements of any gift, grant, or funding program (including the L.A.N.D. grant program) or to any applicable law which expressly provides for a different disposition of

the proceeds. Grantee shall use its share of the proceeds in a manner consistent with the conservation purpose set forth herein.

B. Cooperation. Whenever all or any part of the Premises or any interest therein is taken by public authority under power of eminent domain or other act of public authority, the Grantor and the Grantee shall cooperate in recovering the full value of all direct and consequential damages resulting from such action. All related expenses incurred by the Grantor and the Grantee shall first be paid out of any recovered proceeds, and the remaining proceeds shall be distributed between the Grantor and Grantee in shares equal to such proportionate value, subject, however, to the requirements of any gift, grant, or funding program (including the L.A.N.D. grant program) or to any applicable law which expressly provides for a different disposition of the proceeds. If a less than fee interest is taken, the proceeds shall be equitably allocated according to the nature of the interest taken.

C. Use of Proceeds. The Grantee shall administer its share of the proceeds in trust for use in a manner consistent with the conservation purposes set forth herein.

## VI. DURATION AND ASSIGNABILITY

A. Running of the Burden. The burdens of this Conservation Restriction shall run with the Premises in perpetuity, and shall be enforceable against the Grantor and the successors and assigns of the Grantor holding any interest in the Premises.

B. Execution of Instruments. The Grantee is authorized to record or file any notices or instruments appropriate to assuring the perpetual enforceability of this Conservation Restriction; and the Grantor appoints the Grantee as attorney-in-fact to execute, acknowledge and deliver any such instruments on the Grantor's behalf. Without limiting the foregoing, the Grantor agrees to execute any such instruments upon request.

C. Running of the Benefit. The benefits of this Conservation Restriction shall run to the Grantee, shall be in gross and shall not be assignable by the Grantee, except in the following instances from time to time. As a condition of any assignment, the Grantee shall require that the purpose of this Conservation Restriction continues to be carried out; and that the assignee, at the time of assignment, qualifies under Section 170(h) of the Internal Revenue Code of 1986, as amended, and applicable regulations thereunder, and under Section 32 of Chapter 184 of the General Laws, as an eligible donee to receive this Conservation Restriction directly. Any assignment shall comply with Article 97 of the Amendments to the Constitution of the Commonwealth of Massachusetts, if applicable.

D. Right of Enforcement. Notwithstanding the foregoing, the Grantee shall have the right, in accordance with M.G.L., c. 184, s.32, to assign the right to enforce this Conservation Restriction, so long as the assignee is a governmental body, charitable corporation or trust, or other entity which at the time of such assignment would be qualified to hold this Conservation Restriction. Unless expressly stated otherwise in the instrument of assignment, no such assignment of the right to enforce this Conservation Restriction shall diminish the rights or benefits held by the Grantee or its successors pursuant to this Conservation Restriction, and the Grantee shall retain the equivalent right to enforce this Conservation Restriction.

## VII. SUBSEQUENT TRANSFERS.

A. Conveyance of the Premises. The Grantor agrees to incorporate by reference the terms of this Conservation Restriction in any deed or other legal instrument by which the Grantor conveys any interest in all or a portion of the Premises, including a leasehold interest, and to notify the Grantee within 20 days of such transfer. Failure to do either shall not impair the validity or enforceability of this Conservation Restriction. Any transfer shall comply with Article 97 of the Amendments to the Constitution of the Commonwealth of Massachusetts, if applicable.

B. Termination of Rights and Obligations. Notwithstanding anything to the contrary contained herein, the rights and obligations under this Conservation Restriction of any party holding any interest in the Premises shall terminate upon transfer of that party's interest, except that liability for acts or omissions occurring prior to transfer, and liability for the transfer itself if the transfer is in violation of this Conservation Restriction, shall survive the transfer. Any new owner shall cooperate in the restoration of the Premises or removal of violations caused by prior owner(s) and may be held responsible for any continuing violations.

C. No Merger. The parties intend that no future transfer of the Premises or of the rights of the Grantee hereunder shall result in a merger of this Conservation Restriction into the fee. Nevertheless, no deed or other instrument shall be effective if its result would be that both the Premises and the rights of the Grantee hereunder would be held by the same entity, and both parties agree not to accept or record any such deed or other instrument, unless in both cases the Conservation Restriction has been assigned to a non-fee owner to avoid merger and assure the continued enforceability by a non-fee owner.

## VIII. ESTOPPEL CERTIFICATES.

Upon request by the Grantor, the Grantee shall, within thirty (30) days, execute and deliver to the Grantor any document, including an estoppel certificate, which certifies the extent of Grantor's compliance with any obligation of the Grantor contained in this Conservation Restriction.

## IX. REPRESENTATIONS OF THE GRANTEE.

The Grantee represents that it is a private, charitable, non-profit conservation land trust, that it qualifies as a holder of a conservation restriction under the first sentence of General Laws, chapter 184, section 32, that it is a qualified organization as that term is defined in Section 170(h)(3) of the Internal Revenue Code of 1986, that it is organized and operated for the purpose of preserving and conserving natural resources, natural habitats and environmentally sensitive areas and for other charitable, scientific and educational purposes, and that it has both the necessary funds and the commitment to hold this Conservation Restriction exclusively for conservation purposes in perpetuity and to enforce its terms.

## X. AMENDMENT

Should circumstances in the future occur that make an amendment to this Conservation Restriction appropriate, any such amendment shall be in writing signed by the parties hereto and

shall be effective only when approved by the Worcester City Council and City Manager and the Secretary of Energy and Environmental Affairs under Section 32 of Chapter 184 of the General Laws and recorded at the Worcester District Registry of Deeds, provided however that no amendment shall affect the perpetual duration of this Conservation Restriction or its qualification or the status of Grantee under any applicable laws, including Section 170(h) of the Internal Revenue Code of 1986, as amended, or Sections 31-33 of Chapter 184 of the General Laws of Massachusetts, and any amendment shall be consistent with the purposes of this Conservation Restriction and with the provisions of Article 97 of the Amendments to the Massachusetts Constitution if applicable.

#### XI. EFFECTIVE DATE.

This Conservation Restriction shall be effective when the Grantor and the Grantee have executed it, the administrative approvals required by Section 32 of Chapter 184 of the General Laws have been obtained, it has been delivered to the Grantee and recorded in the Worcester District Registry of Deeds. The Grantee shall record this instrument in a timely manner.

#### XII. NOTICES.

Any written notice required or permitted hereunder shall be deemed delivered if sent by certified mail, return receipt requested, postage prepaid, to the Grantor or the Grantee at the addresses set forth at the beginning of this instrument or, with respect to assignees, to the address set forth in a recorded instrument transferring title to the Premises or rights hereunder, or to such other addresses as the parties may designate in writing from time to time or as are reasonably ascertainable.

#### XIII. CONSTRUCTION.

A. Controlling Law. The interpretation and performance of this Conservation Restriction shall be governed by the laws of the Commonwealth of Massachusetts.

B. Liberal Construction. Any general rule of construction to the contrary notwithstanding, this Conservation Restriction shall be liberally construed in favor of the grant to effect the purpose of this Conservation Restriction and the policy and purposes of Massachusetts General Laws Chapter 184, Sections 31-33. If any provision in this instrument is found to be ambiguous, any interpretation consistent with the purpose of this Conservation Restriction that would render the provision valid shall be favored over any interpretation that would render it invalid.

C. Severability. If any provision of this Conservation Restriction or the application thereof to any person or circumstance is held to be invalid, the remainder of this Conservation Restriction shall not be affected thereby.

D. Entire Agreement. This instrument sets forth the entire agreement of the parties with respect to this Conservation Restriction and supersedes all prior discussions, negotiations, understandings or agreements relating to the Conservation Restriction, all of which are merged herein.

E. Joint Obligation. The obligations imposed by this Conservation Restriction upon the parties that together comprise the "Grantor" shall be joint and several.

F. Captions. The captions in this instrument have been inserted solely for convenience of reference and are not a part of this instrument and shall have no effect upon construction or interpretation.

G. Pre-existing Public Rights. Approval of this Conservation Restriction by any municipal officials and by the Secretary of Energy and Environmental Affairs is not to be construed as representing the existence or non-existence of any pre-existing rights of the public in and to the Premises, and any such pre-existing rights of the public are not affected by the granting of this Conservation Restriction.

The signature pages, and the attachments incorporated herein, are as follows:

Signature page for the City of Worcester by its City Manager

Acceptance by Greater Worcester Land Trust, Inc.

Approval by the Worcester City Council and City Manager

Approval by the Secretary of the Energy and Environmental Affairs

Exhibit A, being the legal description of the Premises

Exhibit B, being a reduced copy of the plan showing the Premises

Executed under seal this 22<sup>nd</sup> day of October, 2014.

City of Worcester

By:

Edward M. Augustus, Jr.  
Edward M. Augustus, Jr., City Manager

**COMMONWEALTH OF MASSACHUSETTS**

Worcester, ss.

On this 22<sup>nd</sup> day of October, 2014, before me, the undersigned notary public, personally appeared Edward M. Augustus, Jr., City Manager, proved to me through satisfactory evidence of identification, which were Personal Knowledge, to be the person whose name is signed on this document, and acknowledged to me that he signed it voluntarily for its stated purpose.

Notary Public

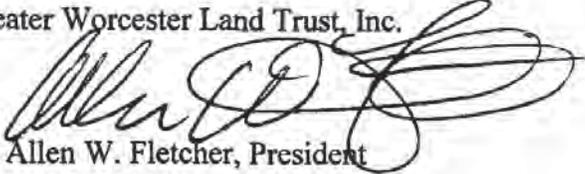
Jeannie M. Michelson



**JEANNIE M. MICHELSON**  
Notary Public  
Commonwealth of Massachusetts  
My Commission Expires  
July 24, 2020

**ACCEPTANCE OF GRANT**

At a duly held meeting on May 21st, 2014, the board of directors of Greater Worcester Land Trust, Inc. voted to accept the foregoing Conservation Restriction. The president and treasurer are authorized to sign this acceptance pursuant to General Laws, chapter 180, section 10C and chapter 156B, section 115. The foregoing Conservation Restriction is accepted this day of June 30, 2014.

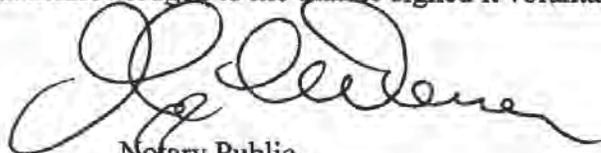
Greater Worcester Land Trust, Inc.  
By:   
Allen W. Fletcher, President

By: Nancy Meehan  
Nancy Meehan, Treasurer

**COMMONWEALTH OF MASSACHUSETTS**

Worcester, ss.

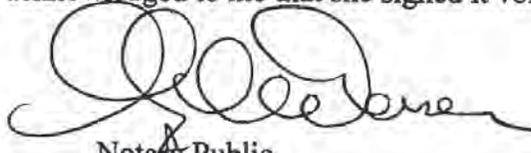
On this 30 day of June, 2014, before me, the undersigned notary public, personally appeared Allen W. Fletcher, proved to me through satisfactory evidence of identification, which were personal knowledge, to be the person whose name is signed on this document, and acknowledged to me that he signed it voluntarily for its stated purpose.

  
Notary Public

**COMMONWEALTH OF MASSACHUSETTS**

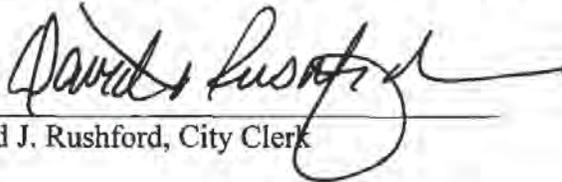
Worcester, ss.

On this 30 day of June, 2014, before me, the undersigned notary public, personally appeared Nancy Meehan, proved to me through satisfactory evidence of identification, which were personal knowledge, to be the person whose name is signed on this document, and acknowledged to me that she signed it voluntarily for its stated purpose.

  
Notary Public

**APPROVAL BY CITY COUNCIL AND CITY MANAGER**

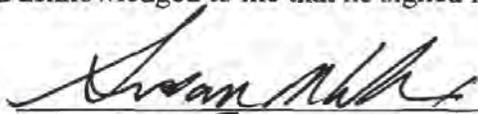
The undersigned, City Clerk of the City of Worcester, Massachusetts, hereby certifies that at a meeting duly held on JUNE 10, 2014, 2014, the City Council voted to approve the foregoing Conservation Restriction to the Greater Worcester Land Trust, Inc. pursuant to M.G.L. Chapter 184 Section 32 and to authorize and direct the City Manager to execute it on behalf of the City.

  
David J. Rushford, City Clerk

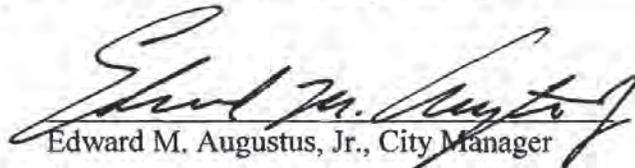
**COMMONWEALTH OF MASSACHUSETTS**

Worcester, ss.

On this 22<sup>nd</sup> day of October, 2014, before me, the undersigned notary public, personally appeared David J. Rushford, City Clerk, proved to me through satisfactory evidence of identification, which were Known to me, to be the person whose name is signed on this document, and acknowledged to me that he signed it voluntarily for its stated purpose.

  
Notary Public Justice of the Peace May 8, 2020

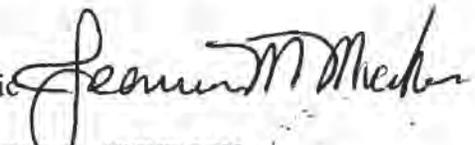
The foregoing Conservation Restriction to the Greater Worcester Land Trust, Inc. is hereby approved pursuant to M.G.L. Chapter 184 Section 32 this 22<sup>nd</sup> day of Oct., 2014.

  
Edward M. Augustus, Jr., City Manager

**COMMONWEALTH OF MASSACHUSETTS**

Worcester, ss.

On this 22<sup>nd</sup> day of October, 2014, before me, the undersigned notary public, personally appeared Edward M. Augustus, Jr., City Manager, proved to me through satisfactory evidence of identification, which were Personal Knowledge, to be the person whose name is signed on this document, and acknowledged to me that he signed it voluntarily for its stated purpose.

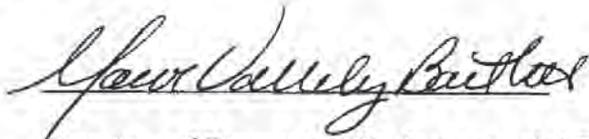
Notary Public   
**JEANNIE M. MICHELSON**  
Notary Public  
Commonwealth of Massachusetts  
My Commission Expires  
July 24, 2020



APPROVAL BY SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS  
COMMONWEALTH OF MASSACHUSETTS

The undersigned, Secretary of the Executive Office of Energy and Environmental Affairs of the Commonwealth of Massachusetts, hereby certifies that the foregoing Conservation Restriction from the City of Worcester to the Greater Worcester Land Trust, Inc., has been approved in the public interest pursuant to M.G.L. Chapter 184, Section 32.

Date: Dec 12, 2014



Secretary of Energy and Environmental Affairs

COMMONWEALTH OF MASSACHUSETTS

P. Holl, ss.

Dec. 12, 2014

Then personally appeared before me the above-named Maeve Valley Bartlett Secretary, Executive Office of Energy and Environmental Affairs, and proved to me through satisfactory evidence of identification, which was **(personal knowledge of identity)** to be the person whose name is signed on the document and acknowledged to me that she signed it voluntarily as Secretary of Energy and Environmental Affairs for the Commonwealth of Massachusetts, for its stated purpose.

Notary Public  
My Commission expires:

**Exhibit A**

## Parcel A

BEGINNING at a point on the northerly line of Montgomery Avenue at Southeasterly corner of Assessor's lot 19-018-39-41 n/f owned by Michael T. Madulka;

THENCE S 87° 47' 48" E 796.74 feet to a point on the westerly side of Harrington Way;

THENCE by the westerly side of Harrington Way 86.39 feet along a curve whose radius is 2250.00' to a point;

THENCE by the westerly side of Harrington Way 469.49 feet along a curve whose radius is 500.00' to a point;

THENCE S 21° 19' 17" W 100.15 feet by the westerly side of Harrington Way to land n/f owned by Melba E. Vargas & George L. Marin;

THENCE S 85° 37' 15" W 882.76 feet to land n/f owned by Lisa A. & Brian S. Nelson;

THENCE N 02° 46' 45" E 381.25 feet to a point;

THENCE N 02° 13' 36" E 334.83 feet to the point of beginning.

Containing 13.700 acres of land more or less and shown as Parcel A on a plan drawn by Northeast Survey Consultants dated April 30th, 2014, and recorded in Worcester District Registry of Deeds, Plan Book No. 907, Plan No. 48.

# Exhibit B



ATTEST: WORC. Anthony J. Vigliotti, Register

# **Attachment B - EcoTarium Savanna Lands Management Study**

*Not an identical copy of the final report. A reconstructed report compiled by Conservation Commission staff for Worcester Conservation Commission from pieces received from Massachusetts Audubon Society staff (8/4/2014).*

## **EcoTarium Savanna Lands Management Study**

**By**

Thomas J. Rawinski  
Mass Audubon  
Ecological Extension Service

**For**

Worcester Natural History Society  
EcoTarium  
222 Harrington Way  
Worcester, MA 01604

### **SUPPORT TEAM & PLAN REVIEWERS:**

Johanna Stacy  
Alexander Goldowsky

March 4, 2004

Ecological Extension Service  
Massachusetts Audubon Society  
208 South Great Road  
Lincoln, MA 01773

781 259 9506 x2159  
781 259 1040 (fax)

## ECOTARIUM SAVANNA LANDS MANAGEMENT STUDY

# TABLE OF CONTENTS

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	<u>Page</u>
<b>Acknowledgments:</b>	2
<b>Summary:</b>	3
<b>Chapter One: Introduction</b>	4
Purpose of the Study	5
Background on Natural and Cultural Resources	5
Recent Investigations	9
<b>Chapter Two: Site Description</b>	10
Physiography	10
Climate	11
Soils	11
Vegetation and Habitats	11
Plant Diversity	12
Wildlife Diversity	12
Disturbances and Threats	15
<b>Chapter Three: Current Management</b>	16
<b>Chapter Four: Recommendations</b>	17
<b>Base Map</b>	20
<b>Literature</b>	22
<b>Appendices</b>	
<b>A.</b> Vascular plants of the savanna lands	
<b>B.</b> Fauna checklists	
<b>C.</b> Fire Ecology Resource Management Educational Unit	

## ACKNOWLEDGMENTS

I gratefully acknowledge the assistance provided by EcoTarium staff members Johanna Stacy and Alexander Goldnowsky. Russel Handsman kindly shared his insights on the natural resources and land use history of the site. And I thank my fellow Mass Audubon colleagues, Jeffrey Collins and Deborah Cary, for their help with several aspects of the project.

## SUMMARY

The purpose of this study was to evaluate the ecological resources of the EcoTarium-owned property lying west of Harrington Way, and to propose management actions that would protect or enhance these resources. The dominant feature of the parcel is a fire-maintained oak “savanna”. A savanna is a structurally distinct type of vegetation characterized by scattered trees amid a matrix of grass or scrub. The EcoTarium’s savanna, while quite small, is nevertheless one of the region’s finest examples.

A floristic inventory, coupled with observations of wildlife, revealed desirable species that are dependent on the present savanna conditions. Despite the fact that the site lies within a heavily developed urban area, the natural features of the site are important and warrant careful stewardship. Connectivity to Crow Hill, which lies to the south, helps maintain habitat for more widely ranging wildlife species.

Most of this property has been left idle, and people in the neighborhood have used it for various purposes. Brush fires have been set here for decades, and they are inherently dangerous. But yet, the rare savanna is a direct consequence of this frequent burning.

Management recommendations focus on three broad areas; 1) continued biological inventory and monitoring, 2) reducing the incidence and impact of inappropriate or ecologically damaging human activities, and 3) conducting ecologically sensitive land management to perpetuate the savanna vegetation and the component species. A vision for the future involves the use of prescribed fire as a means of reducing the hazard of brush fires, while at the same time perpetuating the savanna ecosystem.

# CHAPTER ONE

## INTRODUCTION

The air is still and the morning sun is jumpstarting the day. It is February 20, 2004. The snow is six inches deep and crusty, but the southern exposures are free of snow cover. I had already walked around the savanna and ventured to the top of Crow Hill to the south – watching, listening for wildlife. Chickadees in the gray birches; bluejays and crows flying overhead and perching in distant trees; 22 robins counted at a fruit-laden crabapple tree; cat, dog, human, and four-wheeler tracks in the snow; three sets of turkey tracks in the frozen mud of a trail, a house cat slinking through the dense shrubbery, stalking a flock of tree sparrows while being scolded by a mockingbird; a gray squirrel running away from the base of an oak; two vacant bird nests in young saplings; and cardinals heralding the advent of spring.

Now it is time to sit on a rock by the stonewall among the spreading oaks. What was pasture 75 or so years ago has been kept open by the frequent fires set by Worcester's youth. I marvel at the rare savanna vegetation – widely scattered oak trees on a rolling open terrain. The patchwork of fires that have occurred here can be discerned by the height of the saplings; one-meter-tall groves burned a year ago, two-meter-tall groves burned two years ago, and so on. And scattered about are attractive meadows of little bluestem.

In little time at all the trees and saplings are visited by birds; some are permanent residents, others seasonal. The two-syllable call of the titmouse is heard, and the bird lands on a dead branch above me, searching the cracks for food. Four goldfinches, lacking any evidence of yellow plumage, alight and then flit about. Juncos fly in and out of the sapling groves, and four bluejays land in a nearby oak.

And then a defining moment. A stunning male bluebird has landed on a wide-spreading limb of an oak. It is watching the ground below and swoops down to capture a winter insect. To a closer branch it flies, not four meters away, and then back to its original perch where it is joined by a female. To the right I hear the demure melody of other bluebirds and the pair is joined by two more birds, another male and another female. Evidently the low-hung branches are preferred hunting spots, or perhaps territorialism is setting in, but in either case a fuss ensues. No chance for much feeding now – must chase the intruders! Back and forth, up and down - the little chases consume the next five minutes. During the feud a female finds an opportunity to land on the top of a sumac bush and peck at some berries. And then back to the action.

But now it is now time for me to move on. Back to that crabapple to see if the robins are still there - yes, there they are, still feasting en masse on that fetid fruit. Thank you bluebirds for the morning show, and for helping me understand what I need to write about.

## **Purpose of the Study**

The overriding purpose of this study is to advance the mission of the Worcester Natural History Society (d/b/a EcoTarium):

“To promote appreciation, increase knowledge, and foster stewardship of New England environments by stimulating learning about the world in which we live.”

More narrowly, the study is focused on a roughly 20-acre parcel of Society-owned land located west of Harrington Way in Worcester, across from the EcoTarium main facility. Referred to as the “savanna lands”, this area has experienced a long history of agricultural usage, followed by abandonment, and then frequent burning. It is the burning that has perpetuated the rare savanna-like condition of the vegetation. In addition to the savanna area, the parcel includes an area of mowed lawn and various disturbance features such as an access road, trails, and accumulations of stored materials such as topsoil, wood chips, boulders, and railroad ties. Lacking well defined posted boundaries, one neighbor has converted a portion of the site to lawn and garden, while another portion of land is used by another neighbor to accommodate his expanding greenhouse operation.

Recognizing that no formal management plan existed for this area, the Worcester Natural History Society commissioned the Massachusetts Audubon Society’s Ecological Extension Service to study the management options. The study would address the following objectives:

- a. begin building a list of species that are present year-round or that use the land seasonally as nesting site or hunting area,
- b. identify, map, and assess the significant human impacts on the parcel’s ecological communities, and
- c. develop a management plan for wildlife plantings, limited recreational use, controlled burnings, and interpretive programming.

Another objective of this work is to stimulate further interest in this fascinating area. Much remains to be learned about this ecosystem, and what we learn might change the way in which the area is managed in the future. Beyond observing and documenting the components of this ecosystem, a goal is to perceive how this ecological system functions, how it is likely to change over time, and how management actions are likely to affect the area and its natural resources. If some of the information from this study is useful in the management of the adjoining Crow Hill property, all the better.

## **Background Information on Natural and Cultural Resources**

In a city as densely populated as Worcester even small natural areas become so very important. They are relics of wildness (or semi-wildness), serving as refuges for biodiversity and affording opportunities for nature study and passive recreation. As neighborhood open space, such areas provide places for young people to do the things that young people do when away from adult supervision. They hang out together, explore, build little “forts”, ride bikes, and no doubt indulge in certain activities that parents would frown upon.

North High School lies directly across the street from the site, and I observed students walking along the trails in the morning to get to school. The proximity of the school presents a marvelous opportunity for use of the area as an outdoor classroom.

The mowed lawn portion of the site accommodates overflow parking during special events at the EcoTarium, and seems to be the area most often visited by the neighbors. Local youth sports organizations occasionally use the area for sports practice. I observed two men hitting golf balls here, and evidence suggests that people walk their dogs here.

While it is true that certain wildlife species cannot possibly sustain viable populations within such small tracts of land (Saunders et al. 1991), there are yet other organisms that seem to be able to persist just fine (e.g., plants, most insects, smaller mammals, and some bird species). The gray squirrel, raccoon, American Robin and Northern Cardinal actually seem to thrive in a suburban environment. For migratory birds these areas can serve as bed-and-breakfast habitats or wintering sites. In late summer the goldenrods and asters help sustain migrating monarch butterflies.

The savanna is somewhat connected to other tracts of semi-natural habitat (Crow Hill to the south, other EcoTarium lands to the east, and Lake Park to the southeast, via the Conrail right-of-way corridor). But the most stunning first impression is that of an island of natural habitat within a densely populated neighborhood (Figures 1 and 2).

We may never know the condition of this land prior to European settlement, when Native Americans inhabited the area. But most certainly the Nipmuc people altered their environment in many ways, e.g., clearing of land for agriculture or home sites, harvesting of firewood, quarrying of rocks and minerals, and burning (Russell 1980). Since present day burning is a driving ecological force in the maintenance of the savanna, it is helpful to imagine what similar landscapes might have looked like when Native Americans burned the land. In *Changes in the Land*, Cronon (1983) cited some eyewitness accounts:

“The Salvages,” wrote Thomas Morton, “are accustomed to set fire of the Country in all places where they come, and to burne it twize a yeare, viz: at the Spring, and the fall of the leafe.” Here was the reason that the southern forests were so open and parklike; not because the trees actually grew thus, but because the Indians preferred them so. As William Wood observed, the fire “consumes all the underwood and rubbish which otherwise would overgrow the country, making it unpassable, and spoil their much affected hunting.” The result was a forest of large, widely spaced trees, few shrubs, and much grass and herbage.

Handsman (1998) described five phases of land use changes that have occurred in this part of Worcester since colonial settlement:

1. In the 18<sup>th</sup> and 19<sup>th</sup> centuries, agricultural fragmentation significantly altered the historic landscape by creating new ecologies and fragmenting the oak-hickory-chestnut forest.
2. By 1880, this process began to reverse itself as some farmlands were abandoned while others were used less intensively.

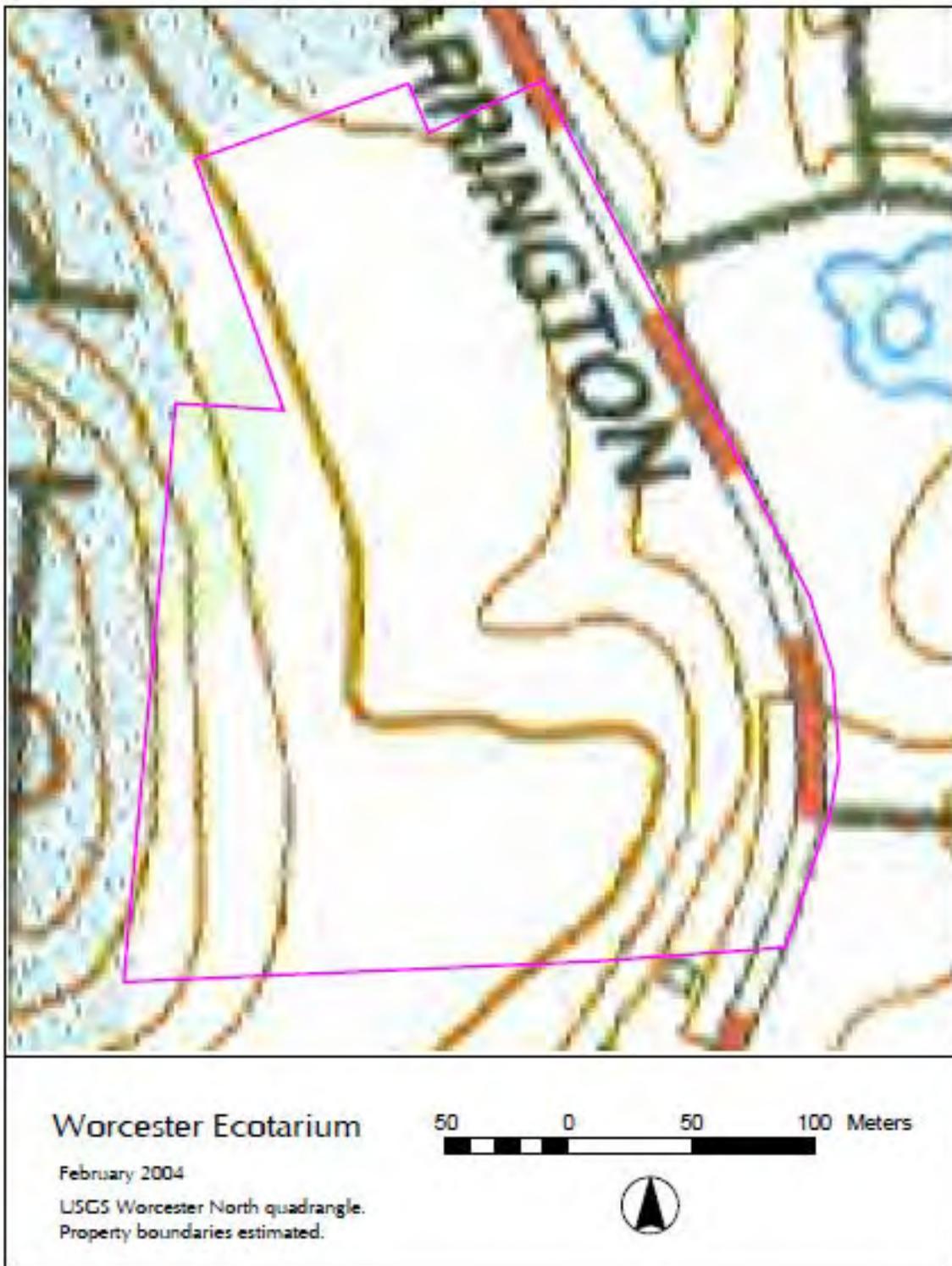
3. Still in the 1930s, the earlier history of farming continued to shape how the local landscape looks and works. By now residential developments had taken over some fields and Crow Hill was still open brush pasture.

4. After World War II, the process of residential fragmentation intensified between 1945 and 1970. More existing empty lots were built upon; new complexes of houses appeared where there were none before.

5. In the contemporary period, from 1970 onwards, the process of residential development continues as new houses are built along empty, unused lots along existing streets.

But for the generosity of the Harrington family, the present site would surely have succumbed to development long ago.

**Figure 1.** The EcoTarium's savanna, shown in a landscape context on the Worcester North topographic map.



**Figure 2.** The EcoTarium's savanna, shown in a landscape context on an April, 1997 aerial photograph.



## Recent Investigations

In 1999 I was conducting a study of Worcester's fire-maintained oak woodlands for the Massachusetts Natural Heritage and Endangered Species Program. Such woodlands were deemed of state-significance because of their unusual suites of early successional plant and animal species. Oehler (1999) stressed the importance of maintaining such habitat conditions in Massachusetts. From a historical perspective, these woodlands provided insights into the kind of vegetation that may have been present in southern New England when Native Americans burned the land on a frequent basis. Unfortunately, all of the best examples of this vegetation in Worcester are the result of decades of illicit activity - the setting of brushfires. In no way did I condone the setting of such fires, because they are inherently dangerous and illegal. But as an ecologist studying the effects of such fires, I couldn't help but be impressed by the rare and aesthetically pleasing resulting vegetation, "born from the ashes of adolescent mischief" (Rawinski 2000).

The EcoTarium's savanna is one such area that I visited in 1999, and for which I submitted documentation to the state. The most immediate consequence of documenting such a site is to prevent inadvertent destruction; all too often, natural areas are destroyed out of ignorance rather than deliberate intention. EcoTarium staff are to be commended for their willingness to protect and manage this area in an ecologically sensitive manner.

The following description, which encompasses both the savanna and Crow Hill, appears in my report (Rawinski 2000):

"The area west of Harrington Way is owned primarily by the Worcester Natural History Society and the Greater Worcester Land Trust. The Natural History Society property lies to the north, across the street from the Ecotarium, while the Land Trust property encompasses 30 acres on Crow Hill to the south. The Land Trust property is slated to be sold/transferred to (the) City of Worcester. Both of these properties have burned at a very high frequency and support exemplary fire-maintained vegetation. The northern portion of the site is about 15 acres in size and is dominated by (a) beautiful expanse of little bluestem. Close to Harrington Way, scattered oak trees create a legitimate savanna landscape over a few acres. The Crow Hill drumlin to the south supports about 17 acres of thicket vegetation dominated by gray birch. Small openings of little bluestem occur amid the birch thicket....."

"The little bluestem grassland and the gray birch thicket both developed on old field sites, as evidenced by the lack of American chestnut (*Castanea dentata*). What's significant is that a long history of burning has kept these areas from succeeding to forest, and at the same time created some fascinating plant communities...."

As a portion of this land has been left more or less idle, generations of Worcester's youth have seen fit to set it on fire, much to the chagrin of members of the Worcester Fire Department who are repeatedly called to the site. Except during unusually wet springs, portions of this area burn every year.

It is tempting to try to get inside the minds of the people who have set the fires over the years. Different people have undoubtedly set fires for different reasons. Some fires might be the result of malicious intent, while others might be characterized as adolescent

mischief. Or, perhaps, some of the fires might actually be set to achieve a specific desired effect on the vegetation, i.e., to keep the area open. Some fires might be accidental, e.g., from lit cigarettes discarded along Harrington Way. Francis E. Putz (2003) has written an insightful and somewhat controversial article on this subject, questioning whether the perpetrators of such fires might be considered “unsung heroes of ecosystem management”.

Little bluestem is the dominant grass at the savanna, and it is very flammable. In burning, little bluestem temporarily eliminates the competing woody vegetation that would otherwise out-compete it. It’s as if this grass species has evolved with fire and relies on fire as part of its survival “strategy”. Somehow, little bluestem advertises to us humans, perhaps subliminally, that its amber thatch will burn much better than anything else.

People and nature have been inextricably linked at the savanna site for years and this association is likely to continue. This study seeks to understand the nature of these interactions, identify the high priority natural resources, and propose methods for managing these resources. Under most circumstances human influences on natural systems would be viewed in a negative light – people tend to degrade or destroy natural systems. While the savanna certainly has been degraded by some human activities, the periodic burning has created not only a rare type of vegetation but also a super habitat for early successional flora and fauna. For obvious reasons we cannot turn a blind eye to the illicit burning. At the same time we might consider alternative approaches to the management of this land that would protect the natural resources that to date have been perpetuated by the illicit fires.

## **CHAPTER TWO**

### **SITE DESCRIPTION**

#### **Physiography**

The site may be characterized as a till-covered rolling upland. Elevation ranges from 560 to 630 feet and increases from east to west. The higher western portion is the lower slope of a drumlin. The eastern portion includes a few small outcrops of bedrock (gneiss). Stonewalls exist as testaments of former agricultural activity.

The site lies within the as the “Southern New England Coastal Plains and Hills” ecoregion (Griffith et al. 1994). An excerpt from the Griffith et al. publication follows:

“The landforms of the subregion are plains with hills with relief of 300-500 feet (90-150 m), and irregular plains with relief of 100-200 feet (30-60 m). Elevations range from sea level to 800 feet (240 m). Bedrock types are mostly granites, schist, and gneiss, and the surface materials include stratified drift, till, lake bottom, alluvium, and marine deposits. Soil patterns are complex and heterogeneous where the numerous, small, till-covered bedrock hills rise above the valleys and the general level of outwash. The forest types are mainly central hardwoods (oak-hickory) with some transition hardwoods (maple-beech-birch, oak-hickory), and, like many other subregions of Massachusetts, some elm-ash-red maple and white-red pine.”

## **Climate**

For a summary of climatic conditions the reader is directed to *Soil Survey of Worcester County, Massachusetts, Northeastern Part* (Taylor and Hotz 1985). The authors provided the following statements:

“ Winters in the survey area are cold, and summers are moderately warm with occasional hot spells.... Precipitation is well distributed throughout the year and is nearly always adequate for all crops.”

Bertin (2000) is an excellent source of information on Worcester's climate, as well as other information related to Worcester's geology, soils, human impact, and vegetation.

## **Soils**

At the time when the soil survey for this area was prepared, three soil units were present at the site (Taylor and Hotz 1985). The eastern portion was mapped as Chatfield-Hollis Rock outcrop complex, 3 to 15 percent slopes. This is a well drained to somewhat excessively drained soil found on hills and ridges. Toward the middle of the site, along the toe-slope of the drumlin that rises to the west, is Woodbridge fine sandy loam, 3 to 8 percent slopes. This soil, found on drumlins and glacial till uplands, is very deep, gently sloping, and moderately well drained. Farthest to the west, on the drumlin foot-slope, is Paxton fine sandy loam, 8 to 15 percent slopes. This soil, also typical of drumlins, is very deep, strongly sloping, and well drained. As part of the northern portion of the site has been filled and leveled in recent years, such soils would now be mapped as “Udorthents, smoothed”.

## **Vegetation and Habitats**

The site is a mosaic of distinctly different or, in some cases, intergrading vegetation types and habitats. The vegetation reflects the nature of the soils, land uses, and past disturbance events. The filled and leveled land is mostly mowed lawn dominated by exotic species. The roadside thickets along Harrington Way also support many exotics, most notably Japanese knotweed. The access road, trails, and deposits of soil material are similarly rich in exotic species. There are no wetlands on the site, although just to the south lies a small brook which was dammed decades ago to form a small pond.

The savanna proper, situated south of a stonewall, is remarkable free of exotics, reflecting the long history of burning and minimal physical disturbance to the ground surface. There are actually several different kinds of vegetation occurring in the savanna area; groves of open-grown oak trees, dense thickets of tree saplings and shrubs, meadows of little bluestem, and scattered rock outcrops supporting poverty-grass and orange grass. A zone of young, weedy forest exists along much of the western portion of the site.

## **Plant Diversity**

A fairly thorough botanical inventory of the area in 2003 revealed 180 vascular plant species (Appendix A). Not included in this total are the plants that could have been documented in the garden areas and the greenhouse area where neighbors have encroached on the property.

Of the documented plant species, 54 (30%) are exotic. As previously mentioned, most of the exotics were confined to the highly disturbed habitats, primarily within the northern portion of the site and along Harrington Way. Of the native plant species, which prevail in the savanna, 12 are grasses, six are goldenrods, and six are asters. The legume flora is represented by nine species, four of which are exotic.

It is difficult to single-out particularly noteworthy or important plant species in this ecosystem, but certainly the dominant oaks, gray birch, trembling aspen, black cherry, gray dogwood, and little bluestem qualify as such. Other plant species serve as larval host plants for lepidoptera and other insects, or as nectar sources for adult insects. Fruit-bearing shrubs, woody vines, and trees provide an important food source for birds, especially in the fall and winter. Wildflower enthusiasts might be most smitten by the ladies' tresses orchids that bloom in the meadows during late summer. In summer, the meadows are also ablaze with colorful asters and goldenrods. The few plants of Indian grass connote an affinity to the prairie savannas of the Midwest.

At the present time there are no state-listed rare plant (or wildlife) species known from the site.

### **Wildlife Diversity**

Wildlife use of the area has not been thoroughly documented. What is known is described below. In some cases, enough is known to suggest the need for management attention.

The Prairie Warbler is certainly a flagship species of Worcester's fire-maintained savannas and woodlands. Petersen and Meservey (2003) characterized this bird's habitat preferences:

"A species that prefers disturbed areas, the Prairie Warbler has probably expanded its range since the 1600s. In Massachusetts, settler-related activities and subsequent land use patterns, which persisted well into the twentieth century, greatly increased its favored shrubby habitats. The present status is uncertain, but populations may be declining as the forests of Massachusetts mature and suburban sprawl engulfs breeding habitat."

It is likely that the Prairie Warbler nests at the savanna, but this should be confirmed in the spring time. There is no mistaking the ascending trill of the male during the breeding season.

It is easy to see why bluebirds are attracted to the site; open meadows, scattered trees from which to hunt, and perhaps tree cavities suitable for nesting. The beloved Eastern Bluebird would qualify as another flagship species, worthy of management attention.

The discovery of Wild Turkey tracks very close to the property (about 50 m to the south) suggests that the savanna is being used by this increasingly adaptable bird species. For this wide-ranging species, the savanna is just a part of its larger habitat area. As with the Eastern Bluebird, Wild Turkeys would surely delight the human visitor. Excessive or inappropriate human activity might negatively affect the species' use of the area.

Other noteworthy birds observed here in 2003 include the Gray Catbird and Eastern Towhee, both of which seem to thrive in the scrub habitats of the site. A Hairy Woodpecker was observed in the larger oak trees.

While the avifauna of the savanna has not yet been studied in detail, enough has been observed to suggest that the area supports a desirable suite of early successional species, and that such species warrant management attention if they are to persist. The management objective then becomes maintaining the early successional condition of the vegetation. As early as 1914, Frederick H. Kennard observed the rich diversity of bird life associated with an early successional area in Newton, Massachusetts (Kennard 1914):

“The first of these areas, that about the house, is covered with a growth of pines, hemlocks, cedars, birches and various other deciduous trees, among which we have taken pains to cultivate suitable coppice and undergrowth, while the second area, covered with deciduous woods is ... almost devoid of the smaller evergreens or protecting coppice and undergrowth. In the first of these areas some thirty different species of birds breed nearly every year, while in the second area only from three to five different species build their nests.”

As for mammals, there is an account of a red fox den at the site a few years ago, which attracted considerable interest. Presently, gray squirrels and eastern chipmunks are the mammals most often seen. I did observe a den, which I surmised was that of a skunk. I was surprised that I did not see evidence of eastern cottontail rabbits during winter snow conditions; the species probably occurs here, but not as abundantly as one might expect given the shrubby habitats that are present. House cats appear to be the major predator of small mammals and birds at the site, although an occasional fox or coyote would also be expected.

The absence of wetland habitat limits the potential for amphibians. I did not see any snakes on the property, despite turning over some debris in search of them. At the very least, the garter snake should occur here.

Butterflies prefer open habitats and the savanna certainly qualifies as such. Butterflies of many species occur throughout the savanna. As with the early successional birds, the butterflies deserve careful study and management attention. Table 1 identifies the species observed in 2003 at the site, based largely on a one-hour visit by Brian Cassie, the state's leading authority on the group.

I wouldn't be surprised if 40 or more species of butterflies occur at the savanna. More than 70 species have been documented from the much larger Broad Meadow Brook Wildlife Sanctuary, which is also in Worcester and has similar open habitat along a powerline right-of-way.

Forty years ago Dethier and MacArthur (1964) documented the decline of the Harris' checkerspot butterfly as an open habitat became increasingly wooded. The sole larval host plant for this checkerspot is tall flat-topped white aster (*Aster umbellatus*), which is intolerant of shade. This aster happens to be fairly common in the savanna, and I

observed damage to its leaves consistent with that caused by checkerspot larvae. This butterfly species should definitely be sought in 2004.

The butterfly diversity of the savanna is a precious resource that deserves management attention. As with the distinctive flora and avifauna, the butterflies depend on the early successional conditions maintained by frequent fire.

**Table 1.** Butterfly species observed at the savanna lands west of Harrington Way.

<b>Hesperiidae - Hesperinae (Grass Skippers)</b>		<b>Year</b>	<b>Comments</b>	<b>Status in MA</b>
<i>Ancyloxypha numitor</i>	Least Skipper	2003	1 observed on Aug. 15	N
<i>Polites peckius</i>	Peck's Skipper	2003	16 observed on Aug. 15	N
<i>Polites themistocles</i>	Tawny-edged Skipper	2003	1 observed on Aug. 15	N
<i>Wallengrenia egeremet</i>	Northern Broken-Dash	2003	3 observed on Aug. 15	N
<b>Hesperiidae - Pyrginae (Spread-wing Skippers)</b>				
<i>Erynnis baptisiae</i>	Wild Indigo Duskywing	2003	1 observed on Aug. 15	N
<b>Lycaenidae - Lycaeninae (Coppers)</b>				
<i>Lycaena phlaeas</i>	American Copper	2003	1 observed on Aug. 15	N
<b>Lycaenidae - Polyommatainae (Blues)</b>				
<i>Celastrina neglecta</i>	Summer Azure	2003	1 observed on Aug. 15	N
<i>Everes comyntas</i>	Eastern Tailed-Blue	2003	4 observed on Aug. 15	N
<b>Nymphalidae - Danainae (Monarchs)</b>				
<i>Danaus plexippus</i>	Monarch	2003	observed on Sept. 11	N
<b>Nymphalidae - Limenitidinae (Admirals &amp; Relatives)</b>				
<i>Limenitis archippus</i>	Viceroy	2003	2 observed ovipositing on Aug. 15	N
<i>Limenitis arthemis astyanax</i>	'Astyanax' Red-spotted Purple	2003	1 observed on Aug. 15	N
<b>Nymphalidae - Nymphalinae (True Brush-foots)</b>				
<i>Phyciodes tharos</i>	Pearl Crescent	2003	1 observed on Aug. 15	N

**Table 1.** (continued)

<b>Nymphalidae - Satyrinae (Satyrs)</b>				
<i>Cercyonis pegala</i>	Common Wood Nymph	2003	15 observed on Aug. 15	N
<i>Coenonympha tullia</i>	Common Ringlet	2003	1 observed on Aug. 15.	N
<b>Papilionidae - Papilioninae (Swallowtails)</b>				
<i>Papilio glaucus</i>	Eastern Tiger Swallowtail	2003	1 observed on Aug. 15	N

### Pieridae - Coliadinae (Sulphurs)

<i>Colias philodice</i>	Clouded Sulphur	2003	observed on Sept. 5	N
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### Pieridae - Pierinae (Whites)

<i>Pieris rapae</i>	Cabbage White	2003	4 observed on Aug. 15	I
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## Disturbances and Threats

There is little we can do to remedy major disturbances that occurred in the past, such as the leveling of the lawn area. But let us consider some of the disturbances or threats that if remedied might improve the ecological condition or aesthetics of the area.

***Encroachment by neighbors.*** Always a sensitive issue, but one that should definitely be addressed.

***Uncontrolled human use.*** In the absence of signage or regular patrolling, people tend to do what they please here. A serious intrusion is the riding of off-road vehicles, such as four-wheelers. The problem of four-wheelers extends to Crow Hill to the south. The vehicles are loud and degrade the experience people who happen to be walking through the area. They also undoubtedly disrupt wildlife, damage vegetation, and pose a potential hazard to hikers. Many other human activities pose continuing threats, such as the cutting of vegetation, the dumping of trash or yard waste, illegal fires, the running of dogs, vandalism, and pot growing.

***Cessation of burning and resulting succession to woody growth.*** In the absence of the disturbances caused by fire, the area would quickly undergo vegetation succession to more wooded conditions. Many of the most desirable plant and wildlife species would decline or be lost from the area. On the one hand we want to stop the illicit fires, while at the same time explore ways of introducing fire in a safe, prescribed manner to the area.

***Exotic species, aka, biological pollution.*** Exotic plant species are so numerous in the northern portion of the site that attempts to control them might be an exercise in futility; the exotics are superbly adapted to such disturbed site conditions. There are two plant species, however, that do have the potential to invade the more natural vegetation of the savanna and compete with the indigenous species. They are glossy buckthorn and Oriental bittersweet. While the crabapples are exotic species, they don't seem to be terribly invasive and may in fact be desirable as wildlife food plants.

Land managers often plant native and nonnative plant species as a means of improving wildlife habitat. The planting of such species certainly has a place in wildlife management, particularly in the restoration or improvement of degraded sites. For example, such plantings might make sense in the disturbed northern portion of this area, but would be undesirable and unnecessary intrusions in the savanna proper.

English Sparrows and European Starlings might be competing with native cavity-nesting birds, and if bird houses are established, we can anticipate problems with these two exotic birds. Many house cats frequent the area, and while predators are important in any ecosystem, the well-fed tabbies exist here in unnaturally high numbers. They are probably negatively impacting wildlife. Unrestrained dogs also could disrupt wildlife and potentially bark at, or bite, people walking through the area.

***Land development.*** We have to recognize that the possibility exists that this land could be developed to expand EcoTarium facilities, or perhaps sold. Obviously such a decision would very carefully evaluated, but the threat is nevertheless there.

## CHAPTER THREE

### CURRENT MANAGEMENT

To date there has been little management directed specifically at the biological resources of the site. A bird nest box does exist in a large oak tree, but I do not know who put it there, or for what particular species of bird it was intended. While EcoTarium staff and visitors do occasionally visit the area, few formal educational or research programs have occurred here. On September 18, 2003, members of the EcoTarium Board's Lands Committee did meet on site and were guided through the area. The area was characterized as a diamond in the rough, i.e., an area on ecological interest that might be put to greater use by the organization.

As part of regular operations and grounds maintenance the lawn area is periodically mowed. Portions of the site are used to stockpile soil, railroad ties, and other materials. The trails that traverse the savanna are not maintained by EcoTarium staff. Rather, they appear to be kept open by the people who regularly use them.

## CHAPTER FOUR

### RECOMMENDATIONS

***Ecological management committee, task force, or working group.*** EcoTarium staff, volunteers, and board members are encouraged meet regularly to discuss ecological management issues. The existing Lands committee might be the forum for these discussions. Such a group would be instrumental in setting management priorities for this parcel, while also addressing broader ecological management issues of the organization. Over time, new management issues or opportunities will undoubtedly arise, and the committee would be in a position to respond to these in an proactive manner.

***Gain control of the land base.*** It is important that the EcoTarium exerts management control over its property. Boundaries should be re-surveyed if necessary and posted appropriately. Neighbors who have encroached on the property should be gently urged to respect property rights. In the long run, a neighbor's property values will be enhanced if the EcoTarium lands are kept pristine and maintained as a nature reserve. There is great potential for this to be a win-win situation. Good relations with the neighbors might even lead to fewer cats out on the property, if the neighbors are encouraged to keep their cats indoors.

***Look beyond the present parcel.*** It would be most unfortunate if the private land presently separating the savanna and Crow Hill were developed. If on the other hand this land could be protected, a marvelous connection to Crow Hill would be secured, providing hiking opportunities far greater than presently available. And, an important corridor for wildlife would be protected.

***Biological inventory.*** It is difficult to manage a natural area without first knowing much about the biological resources present. As a start, day-lists of the biota should be recorded, perhaps by using the species checklists presented in Appendix B. Local experts on certain groups of organisms should be encouraged to visit the site and conduct biological inventories or educational programs. In time, a clearer picture of the biota will emerge, as will a clearer understanding of what should be done to perpetuate the significant biological resources.

***Fire management plan.*** A fire management plan is a detailed document that addresses many facets of fire on a particular landscape. Such a plan would also be a necessary prerequisite of any future prescribed burning at the site. Prescribed fire not only has the potential to maintain or improve the habitat conditions of the savanna, but might also be justified in terms of public safety. For example, one of the best ways of reducing the threat and hazard of illicit burning is to reduce or eliminate the available fuels through a prescribed burning program. With fire suppression equipment already on site, and with weather conditions within the "prescription window", prescribed fires are likely to be far safer than any wildfire. While a fire management plan might be costly, perhaps in the range of \$5,000, its value cannot be underestimated.

There is one thing that could be done this year to reduce the threat of fire. If the existing trails through the savanna were widened to about eight feet and mowed repeatedly throughout the growing season the trails would then serve as fire breaks, containing many of the fires that get started here. Mowed trails would also reduce the risk of ticks to people walking through the area.

Proponents of prescribed fire are faced with the challenge of overcoming the “Smokey Bear” syndrome. We all were taught that fire destroys forests and decimates wildlife. But slowly, a different thinking is taking hold. The horrific wildfires in the West are now seen as a consequence of long periods of fire suppression, where fuels have accumulated to dangerously high levels. Various state and federal agencies and conservation organizations now conduct prescribed burning for the dual purpose of enhancing public safety and improving habitat conditions. A booklet produced by the Interagency Fire Education Initiative (1995) is appended to this report as Appendix C. An excerpt from that booklet follows:

Smokey Bear, perhaps the most successful fire prevention education icon in the United States, is promoted primarily to address accidental human-caused wildfires. The need for Smokey Bear’s messages is as relevant today as it was in 1945 when the idea was first put forth. Smokey Bear’s message must not be interpreted as “all fire is bad”. Managed or prescribed fire is one of today’s modern ecological management practices. ... With the proper interpretation, Smokey Bear’s message can help clarify the distinctions between desirable and undesirable fires.”

***Ecosystem management and single species management.*** An ecosystem management approach, e.g., maintaining early successional conditions in the savanna, preferably through the use of prescribed fire, will likely benefit a wide range of desirable species such as the butterflies, the flora, and the shrubland-nesting birds. To the extent possible, the “naturalness” of the savanna should be preserved. The planting of herbaceous or woody species is not recommended for this area because they would degrade the naturalness of the area, and because they don’t seem to be necessary, given the present diversity of plant life and structural growth forms. There seems to be ample fruit-bearing woody plants for wildlife in the area.

Cutting or mowing in the savanna area, in very selected areas, could help maintain the desired early successional condition of the vegetation. Of course, this would be labor intensive and is ecologically less preferable to burning. Nevertheless, cutting of woody species should remain a management option, especially if prescribed fire is not feasible in the future. Two invasive exotic woody plants, glossy buckthorn and Oriental bittersweet, should be cut, pulled, or otherwise removed from the savanna area as soon as possible. These species have the potential to out-compete the native species. As for the native woody species, I would suggest they not be cut, at least for a period of ten years, or until their growth is deemed to compromise the ecology of the savanna biota.

In terms of single-species management, bluebird nest boxes would likely invite this species to nest in the area, if it isn’t already nesting in natural cavities. About ten boxes, strategically placed in the area, might suffice and indicate to the visiting public that active wildlife management is occurring on the site. The Massachusetts Bluebird Association (89

Pulpit Rd., Amherst, MA 01002) offers helpful advice in monitoring nesting success and maintaining bluebird boxes. Appropriate signage at trailheads or attached to the nest box poles might limit vandalism of the boxes.

**Educational opportunities.** People tend to protect the things they love. If we want people to appreciate and, I dare say, love this area, they should be given the opportunities for such. This would certainly be in keeping with the mission of the Worcester Natural History Society. The mowed fire breaks might double as a self-guided nature trail, and formal educational programs could be conducted here, investigating the bird life, wildflowers, fire ecology, land use history, butterflies, etc. To make the area more aesthetically pleasing, some of the unsightly piles of soil, rock, and railroad ties might be relocated, and the area regularly patrolled for trash. If nest boxes are established, regular monitoring of nesting success can be a particularly rewarding activity.

Related to the biological inventory recommendation, volunteers, staff, or the general public should be encouraged to submit their daily observations, using the species checklists, to a central office. These observations should then be carefully stored in appropriate notebooks or files, and each year the data summarized.

It is my sense that the savanna and its biological resources can tolerate a certain level of human use, such as passive recreation, nature study, walking to or from school, and perhaps even the occasional mountain bike riding. Over time, a goal might be to replace the user group that is prone to inflicting damage on the ecosystem with one that is inclined to respect the property and tread lightly.

**Monitor the effects of management actions.** The monitoring options are many. For example, permanent vegetation plots could be established to document vegetation change over time. Or, photographic documentation of vegetation change could be achieved by using fixed points of reference. Butterflies could be identified to species and counted at particular times of the year at particular sites, preferably where the vegetation is also being monitored. Breeding bird census points could be established and visited annually to track the success of breeding birds. Any nest boxes established should be monitored for breeding success and maintained in suitable working order.

**Managing Visitor Use.** Regular patrolling, open discussions with neighbors, and signs could be used to discourage damaging or inappropriate use of the area. Motorized vehicles pose the most serious immediate threat that should be addressed. Dogs, if allowed at all, should definitely be leashed at all times.

**Forging/Continuing Partnerships.** One advantage of being situated within a large metropolitan area is the potential for partnerships with many institutions and organizations. Educators might be encouraged to use the area as outdoor classrooms, scout groups could help with trail improvements or interpretive materials, and individuals from other conservation organizations or agencies could be asked to provide advice on matters of land management.

## **Base Map**

It was beyond the scope of the present study to map in detail the vegetation units, existing or recommended trails, potential fire breaks, potential nature trails, and other such features. However, Figure 3 is provided to show overall vegetation conditions, and could be used as a base map for more detailed planning. In Figure 3 the area of mowed lawn is clearly shown at the northern portion of the property. The area with greatest ecological value is the land to the south of the lawn, roughly the southern half of the property. Some of the existing trails through the savanna area are clearly visible; these might become either managed nature trails or fire breaks in the future. Neighbors have encroached on the property along the northern border of the property and along the eastern portion of the southern boundary.

**Figure 3.** Aerial photograph base map showing features of the site.



## LITERATURE

In addition to any of several field guides, the following publications provide a wealth of potentially useful information. *New England Wildlife* (DeGraaf and Yamasaki 2001) is comprehensive and detailed, as is *Birds of Massachusetts* (Veit and Petersen 1993) and *Massachusetts Breeding Bird Atlas* (Petersen and Meservey 2003).

*Vascular Flora of Worcester, Massachusetts* (Bertin 2000) and *The Vascular Plants of Massachusetts: A County Checklist* (Sorrie and Somers (1999) are essential references for the study of the local flora. Jackson's flora (1909) provides a historical benchmark for the region's plant life.

Skehan (2001) is a good source of information on Massachusetts geology. A Massachusetts Historical Commission report (1980) is particularly useful to those who wishing to learn more about the historic and archaeological resources of central Massachusetts.

Two essential references for the conservationist are *Our Irreplaceable Heritage. Protecting Biodiversity in Massachusetts* (Barbour et al. 1998) and *Biomap. Guiding Land Conservation for Biodiversity in Massachusetts* (Natural Heritage and Endangered Species Program 2001).

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**Appendix A.** Vascular plants of the savanna lands, west of Harrington Way.

**Trees**

**Dicots**

**Family: Aceraceae (Maple Family)**

<i>Acer platanoides</i>	Norway Maple	2003	infrequent; in fertile soil in young woods on western portion of site	I
<i>Acer saccharum</i>	Sugar Maple	2003	one sapling seen	N

**Family: Betulaceae (Birch Family)**

<i>Betula pendula</i>	Weeping Birch	2003	one tree in savanna	I
<i>Betula populifolia</i>	Gray Birch	2003	abundant; sprouting vigorously following fire	N

**Family: Fabaceae (Bean Family)**

<i>Robinia pseudoacacia</i>	Black Locust	2003	scarce; eastern edge of site near Harrington Way	I
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**Family: Fagaceae (Beech Family)**

<i>Quercus alba</i>	White Oak	2003	occasional in savanna	N
<i>Quercus coccinea</i>	Scarlet Oak	2003	scarce; in savanna	N
<i>Quercus palustris</i>	Pin Oak	2003	one individual (probably planted) near Harrington Way	N
<i>Quercus rubra</i>	Northern Red Oak	2003	the largest trees of the savanna; in gentle depression	N
<i>Quercus velutina</i>	Black Oak	2003	frequent; the dominant tree of the savanna	N

**Family: Juglandaceae (Walnut Family)**

<i>Carya glabra</i>	Pignut Hickory	2003	infrequent, in savanna	N
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**Family: Lauraceae (Laurel Family)**

<i>Sassafras albidum</i>	Sassafras	2003	locally abundant in savanna	N
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**Family: Oleaceae (Olive Family)**

<i>Fraxinus americana</i>	White Ash	2003	local	N
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**Family: Rosaceae (Rose Family)**

<i>Malus sieboldii</i>	Toringo Crabapple	2003	somewhat frequent; appearing invasive	I
<i>Malus sp.</i>	a Crabapple	2003	one especially prolific crabapple on slope; fruit the size of large grapes	I
<i>Prunus pensylvanica</i>	Pin Cherry	2003	rare; in savanna	N
<i>Prunus serotina</i>	Black Cherry	2003	frequent, sapling-sized individuals repeatedly	N

<i>Sorbus americana</i>	American Mountain-ash	0	sprouting anew rare; southeast corner of site	N
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### Family: Salicaceae (Willow Family)

<i>Populus alba</i>	White Poplar	2003	one small patch of saplings on edge near Harrington Way	I
<i>Populus deltoides</i>	Cottonwood	2003	scarce; disturbed soil near gate near Harrington Way	N
<i>Populus grandidentata</i>	Big-toothed Aspen	2003	infrequent in savanna	N
<i>Populus tremuloides</i>	Trembling Aspen	2003	locally abundant; sprouting vigorously following fire	N

### Family: Simaroubaceae (Quassia Family)

<i>Ailanthus altissima</i>	Tree-of-heaven	2003	scarce, seen on edge of mowed lawn area	I
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### Family: Ulmaceae (Elm Family)

<i>Ulmus americana</i>	American Elm	2003	occasional on moister sites	N
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## Gymnosperms

### Family: Pinaceae (Pine Family)

<i>Pinus strobus</i>	White Pine	2003	rare; one sapling at eastern portion of site	N
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## Shrubs and Woody Vines

### Dicots

### Family: Anacardiaceae (Cashew Family)

<i>Rhus copallinum</i>	Winged Sumac	2003	local; shrubby edges	N
<i>Rhus glabra</i>	Smooth Sumac	2003	locally abundant; sprouting vigorously following fire	N
<i>Rhus hirta</i>	Staghorn Sumac	2003	occasional; locally dominant	N
<i>Toxicodendron radicans</i>	Poison-ivy	2003	local, in black oak woodland	N

### Family: Betulaceae (Birch Family)

<i>Corylus americana</i>	American Filbert	2003	local; thickets in savanna	N
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### Family: Caprifoliaceae (Honeysuckle Family)

<i>Sambucus canadensis</i>	Common Elderberry	2003	scarce; near big oaks in savanna	N
<i>Viburnum dentatum</i>	Arrow-wood	2003	scarce; thickets and young woods	N

### Family: Celastraceae (Staff-tree Family)

<i>Celastrus orbiculata</i>	Oriental Bittersweet	2003	infrequent; mostly along edges	I
<i>Euonymus alata</i>	Winged Euonymus	2003	rare; thicket near greenhouses	I

### Family: Cornaceae (Dogwood Family)

<i>Cornus racemosa</i>	Gray Dogwood	2003	locally abundant on moister sites; abundant fruit crop	N
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valuable to wildlife

### Family: Ericaceae (Heath Family)

<i>Gaylussacia baccata</i>	Black Huckleberry	2003	local, in savanna	N
<i>Vaccinium angustifolium</i>	Low Sweet Blueberry	2003	local	N
<i>Vaccinium corymbosum</i>	Highbush Blueberry	2003	rare; eastern portion of area	N
<i>Vaccinium pallidum</i>	Early Sweet Blueberry	2003	rather frequent, in savanna and	N

### Family: Grossulariaceae (Gooseberry Family)

<i>Ribes sp.</i>	a Gooseberry/Currant	2003	rare; moist fertile young woods along western edge	N/I
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### Family: Myricaceae (Bayberry Family)

<i>Comptonia peregrina</i>	Sweet Fern	2003	local; eastern portion of site	N
<i>Myrica pensylvanica</i>	Bayberry	2003	scarce, in shrubby edge vegetation	N

### Family: Rhamnaceae (Buckthorn Family)

<i>Rhamnus frangula</i>	Glossy Buckthorn	2003	scarce; seen along edge of mowed lawn area	I
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### Family: Rosaceae (Rose Family)

<i>Crataegus sp.</i>	Hawthorn	2003	scarce; in savanna	N
<i>Prunus virginiana</i>	Choke Cherry	2003	occasional, moist shrubby areas	N
<i>Rosa carolina</i>	Pasture Rose	2003	scarce, in savanna	N
<i>Rosa multiflora</i>	Multiflora Rose	2003	infrequent, primarily along shrubby edge of mowed lawn area	I
<i>Rubus allegheniensis</i>	Allegheny Blackberry	2003	frequent in savanna and bordering shrubby areas	N
<i>Rubus flagellaris</i>	Whip Dewberry	2003	occasional	N
<i>Rubus occidentalis</i>	Black Raspberry	2003	local; moist young woods along western edge	N
<i>Spiraea alba var. latifolia</i>	Meadowsweet	2003	common and locally dominant on wetter sites	N
<i>Spiraea tomentosa</i>	Steeple-bush	2003	scarce; moist shrubby areas	N

### Family: Salicaceae (Willow Family)

<i>Salix humilis</i>	Upland Willow	2003	scarce, in savanna	N
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### Family: Solanaceae (Nightshade Family)

<i>Solanum dulcamara</i>	Bittersweet Nightshade	2003	local; moist fertile soil along western edge	I
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### Family: Vitaceae (Grape Family)

<i>Parthenocissus quinquefolia</i>	Virginia Creeper	2003	local, in black oak woodland	N
<i>Vitis labrusca</i>	Fox Grape	2003	local, along moist edges	N

## **Forbs** **Dicots**

## Family: Apiaceae (Parsley Family)

		<u>Year</u>	<u>Comments</u>	<u>Status in MA</u>
<i>Daucus carota</i>	Queen Anne's Lace	2003	infrequent, mostly on disturbed ground	I

## Family: Apocynaceae (Dogbane Family)

<i>Apocynum androsaemifolium</i>	Pink Dogbane	2003	peppered throughout; an important nectar source for insects	N
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## Family: Asclepiadaceae (Milkweed Family)

<i>Asclepias syriaca</i>	Common Milkweed	2003	occasional; an important host plant for monarch butterflies	N
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## Family: Asteraceae (Aster Family)

<i>Achillea millefolium</i>	Yarrow	2003	local; mostly on disturbed ground	N/I
<i>Ageratina altissima</i>	White Snakeroot	2003	local, in fertile soil in young woods on western edge	N
<i>Ambrosia artemisiifolia</i>	Ragweed	2003	occasional in disturbed soils and near bedrock outcrops	N
<i>Arctium minus</i>	Common Burdock	2003	scarce; moist thicket along western edge	I
<i>Artemisia vulgaris</i>	Mugwort	2003	rare; a plant seen on edge of mowed lawn area	I
<i>Aster dumosus</i>	Bushy Aster	2003	occasional in savanna	N
<i>Aster fragilis</i>	Small White Aster	2003	occasional in savanna	N
<i>Aster lateriflorus</i>	Calico Aster	2003	scarce; moist soil in savanna	N
<i>Aster macrophyllus</i>	Big-leaved Aster	2003	local; near big oaks in savanna	N
<i>Aster novae-angliae</i>	New England Aster	2003	scarce, on moist clayey soils	N
<i>Aster umbellatus</i>	Tall Flat-topped White Aster	2003	local; thriving on moister sites; an important nectar plant	N
<i>Bidens frondosa</i>	Devil's Pitchforks	2003	local; edge of moist thickets	N
<i>Bidens vulgata</i>	Tall Beggar-ticks	2003	scarce, disturbed ground	N
<i>Centaurea biebersteinii</i>	Spotted Knapweed	2003	scarce, near gate to mowed lawn area	I
<i>Conyza canadensis</i>	Horseweed	2003	infrequent; primarily disturbed ground and near bedrock outcrops	N
<i>Erechtites hieraciifolia</i>	Pilewort	2003	scarce, in burned areas of savanna	N
<i>Erigeron strigosus</i>	Lesser Daisy-fleabane	2003	scarce, in savanna	N
<i>Eupatorium perfoliatum</i>	Boneset	2003	scarce, in savanna grassland	N
<i>Euthamia graminifolia</i>	Grass-leaf Goldenrod	2003	frequent	N
<i>Gnaphalium obtusifolium</i>	Sweet Everlasting	2003	infrequent in savanna	N
<i>Hieracium caespitosum</i>	King-devil	2003	occasional	I
<i>Hieracium sabaudum</i>	Savoy Hawkweed	2003	infrequent, but likely to increase	I
<i>Hieracium x floribundum</i>	Pale Hawkweed	2003	frequent on mowed	I

			lawn area	
<i>Ionactis linariifolius</i>	Stiff Aster	2003	infrequent in savanna	N
<i>Lactuca canadensis</i>	Yellow Wild Lettuce	2003	infrequent	N
<i>Lactuca serriola</i>	Prickly Lettuce	2003	scarce; disturbed ground	I
<i>Leontodon autumnalis</i>	Fall-dandelion	2003	scarce, edge of mowed lawn area	I
<i>Rudbeckia hirta</i>	Black-eyed Susan	2003	scarce, edge of mowed lawn area	I
<i>Solidago canadensis</i>	Canada Goldenrod	2003	local	N
<i>Solidago juncea</i>	Early Goldenrod	2003	frequent, in savanna area and along edges	N
<i>Solidago nemoralis</i>	Gray Goldenrod	2003	rather frequent in savanna area, on the poorest soils	N
<i>Solidago puberula</i>	Downy Goldenrod	2003	occasional in savanna	N
<i>Solidago rugosa</i>	Rough Goldenrod	2003	common, especially on moister sites	N
<i>Taraxacum officinale</i>	Dandelion	2003	occasional in mowed lawn area	I

### Family: Balsaminaceae (Touch-me-not Family)

<i>Impatiens capensis</i>	Spotted Touch-me-not	2003	local; moist fertile soil along western edge	N
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### Family: Brassicaceae (Mustard Family)

<i>Alliaria petiolata</i>	Garlic-mustard	2003	locally abundant; moist fertile soil along western edge	I
<i>Barbarea vulgaris</i>	Yellow Rocket	2003	scarce, in/near mowed lawn area	I
<i>Lepidium virginicum</i>	Poor-man's Pepper	2003	rare, near bedrock outcrop	N

### Family: Caryophyllaceae (Pink Family)

<i>Dianthus armeria</i>	Deptford Pink	2003	scarce, edge of mowed lawn area	I
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### Family: Cistaceae (Rockrose Family)

<i>Helianthemum canadense</i>	Canadian Rockrose	2003	local, along trails through black oak woodland	N
<i>Lechea intermedia</i>	Large-podded Pinweed	2003	scarce; dry soil of savanna	N

### Family: Clusiaceae (St. John's-wort Family)

<i>Hypericum gentianoides</i>	Orange Grass	2003	local; abundant near bedrock outcrops	N
<i>Hypericum perforatum</i>	Common St. John's-wort	2003	occasional, particularly near bedrock outcrops	I

### Family: Convolvulaceae (Morning-glory Family)

<i>Calystegia sepium</i>	Wild Morning-glory	2003	infrequent, mostly along edge habitats	N
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### Family: Fabaceae (Bean Family)

<i>Apios americana</i>	Groundnut	2003	local, on moister sites primarily	N
<i>Baptisia tinctoria</i>	Yellow Wild Indigo	2003	infrequent in savanna	N
<i>Desmodium paniculatum</i>	Panicled Tick-trefoil	2003	infrequent, in savanna grassland	N

<i>Lespedeza capitata</i>	Round-headed Bush-clover	2003	infrequent, primarily on soils that were scraped/disturbed in the past	N
<i>Lespedeza intermedia</i>	Wand Bush-clover	2003	rare; disturbed ground on slope at eastern portion of area	N
<i>Trifolium arvense</i>	Rabbit-foot Clover	2003	local, disturbed ground	I
<i>Trifolium aureum</i>	Yellow Hop-clover	2003	scarce; disturbed ground	I
<i>Trifolium repens</i>	White Clover	2003	locally abundant in lawn area	I
<i>Vicia cracca</i>	Cow Vetch	2003	occasional along edge of mowed lawn area	I

### Family: Gentianaceae (Gentian Family)

<i>Bartonia virginica</i>	Virginia Screw-stem	2003	surprisingly abundant in savanna, especially on moister soils	N
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### Family: Geraniaceae (Geranium Family)

<i>Geranium maculatum</i>	Wild Geranium	2003	local; near big oaks in gentle depression of savanna	N
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### Family: Lythraceae (Loosestrife Family)

<i>Lythrum salicaria</i>	Purple Loosestrife	2003	rare; an individual seen on disturbed ground	I
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### Family: Onagraceae (Evening-primrose Family)

<i>Circaea lutetiana</i>	Enchanter's Nightshade	2003	local; moist fertile soil along western edge	N
<i>Oenothera biennis</i>	Common Evening-primrose	2003	occasional; edges of mowed lawn area,	N

### Family: Oxalidaceae (Wood-sorrel Family)

<i>Oxalis stricta</i>	Common Yellow Wood-sorrel	2003	occasional; edges of mowed lawn area,	N
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### Family: Phytolaccaceae (Pokeweed Family)

<i>Phytolacca americana</i>	Pokeweed	2003	locally abundant, primarily in young woods at western portion of the property	N
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### Family: Plantaginaceae (Plantain Family)

<i>Plantago lanceolata</i>	English Plantain	2003	scarce, edge of mowed lawn are	I
<i>Plantago major</i>	Common Plantain	2003	occasional near/in mowed lawn area	N

### Family: Polygalaceae (Milkwort Family)

<i>Polygala sanguinea</i>	Common Milkwort	2003	frequent in savanna on moister soils	N
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### Family: Polygonaceae (Smartweed Family)

<i>Polygonum cuspidatum</i>	Japanese Knotweed	2003	encroaching from edge habitats along Harrington Way	I
<i>Polygonum pennsylvanicum</i>	Pennsylvania Smartweed	2003	scarce; disturbed ground	N
<i>Polygonum persicaria</i>	Lady's Thumb	2003	local; disturbed ground	I

<i>Rumex acetosella</i>	Sheep-sorrel	2003	local, in/near mowed lawn areas	I
<i>Rumex crispus</i>	Curly Dock	2003	scarce; disturbed ground	I
<i>Rumex obtusifolius</i>	Bitter Dock	2003	scarce; disturbed ground	I

### Family: Primulaceae (Primrose Family)

<i>Lysimachia quadrifolia</i>	Whorled Loosestrife	2003	local, in black oak woodland	N
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### Family: Rosaceae (Rose Family)

<i>Potentilla canadensis</i>	Dwarf Cinquefoil	2003	scarce; west edge of mowed lawn area	N
<i>Potentilla simplex</i>	Old Field Cinquefoil	2003	occasional in savanna	N

### Family: Santalaceae (Sandal-wood Family)

<i>Comandra umbellata</i>	Bastard-toadflax	2003	local; in black oak woodland primarily	N
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### Family: Scrophulariaceae (Figwort Family)

<i>Agalinis paupercula</i>	Small-flowered Gerardia	2003	infrequent; moist, bare soil areas	N
<i>Melampyrum lineare</i>	Cow-wheat	2003	infrequent, in black oak woodland	N
<i>Nuttallanthus canadensis</i>	Blue Toadflax	2003	local; disturbed ground and near bedrock outcrops	N
<i>Verbascum thapsus</i>	Common Mullein	2003	scarce, near mowed lawn area	I
<i>Veronica peregrina</i>	Purslane Speedwell	2003	scarce; weedy areas	N

### Family: Verbenaceae (Vervain Family)

<i>Verbena urticifolia</i>	White Vervain	2003	rare; near Harrington Way	N
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### Family: Violaceae (Violet Family)

<i>Viola sororia</i>	Common Blue Violet	2003	scarce; moist woods along western edge	N
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## Monocots

### Family: Araceae (Arum Family)

<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	2003	local; moist fertile young woods along western edge	N
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### Family: Iridaceae (Iris Family)

<i>Iris sp.</i>	an Iris	2003	rare; edge of thicket near greenhouses	N/I
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### Family: Liliaceae (Lily Family)

<i>Convallaria majalis</i>	Lily-of-the-valley	2003	very local, encroaching the southeast portion of site	I
<i>Hemerocallis fulva</i>	Orange Day-lily	2003	small patch seen on edge bordering the mowed lawn area	I
<i>Maianthemum canadense</i>	Canada Mayflower	2003	local; near big oaks in savanna	N
<i>Maianthemum racemosum</i>	False Solomon's Seal	2003	scarce, in black oak woodland	N

<i>Uvularia sessilifolia</i>	Wild Oats	2003	local, in savanna	N
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**Family: Orchidaceae (Orchid Family)**

<i>Spiranthes cernua</i>	Nodding Ladies' Tresses	2003	ca. 20 individuals seen in savanna	N
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**Family: Smilacaceae (Catbrier Family)**

<i>Smilax herbacea</i>	Carrion-flower	2003	scarce, in savanna	N
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**Grasses**

**Family: Poaceae (Grass Family)**

<i>Agrostis capillaris</i>	Rhode Island Bentgrass	2003	occasional; in savanna, especially along trails	I
<i>Agrostis gigantea</i>	Redtop	2003	locally frequent	I
<i>Agrostis hyemalis</i>	Southern Ticklegrass	2003	scarce; moist mineral soil	N
<i>Agrostis perennans</i>	Upland Bentgrass	2003	occasional in savanna	N
<i>Anthoxanthum odoratum</i>	Sweet Vernalgrass	2003	scarce; moist soil in savanna	I
<i>Aristida dichotoma</i>	Poverty-grass	2003	local; near bedrock outcrops primarily	N
<i>Danthonia spicata</i>	Poverty Grass	2003	scarce; dry soil of savanna	N
<i>Dichanthelium acuminatum</i>	Panic-grass	2003	local; dry soil, especially near bedrock outcrops	N
<i>Dichanthelium clandestinum</i>	Deer-tongue	2003	infrequent; seen on edge of mowed lawn area near Harrington Way	N
<i>Dichanthelium depauperatum</i>	Depauperate Panic-grass	2003	scarce; dry soil, usually near bedrock outcrops	N
<i>Digitaria ischaemum</i>	Smooth Crab-grass	2003	occasional; along trails and near outcrops	I
<i>Digitaria sanguinalis</i>	Tall Crab-grass	2003	locally frequent; disturbed ground and near bedrock outcrops	I
<i>Elytrigia repens</i>	Quack-grass	2003	infrequent, in somewhat disturbed grassy vegetation	N
<i>Festuca ovina</i>	Sheep Fescue	2003	local; pathside in savanna	I
<i>Festuca rubra</i>	Red Fescue	2003	occasional in more disturbed soils of savanna	N
<i>Panicum dichotomiflorum</i>	Fall Panic-grass	2003	local; disturbed ground	N
<i>Phleum pratense</i>	Timothy	2003	occasional, in more disturbed sites	I
<i>Poa compressa</i>	Flat-stemmed Bluegrass	2003	infrequent; typically on rocky soil in savanna	I
<i>Poa pratensis</i>	Kentucky Bluegrass	2003	occasional, near trails in savanna and other grassy places	I
<i>Schizachyrium scoparium</i>	Little Bluestem	2003	abundant; the dominant species of the savanna	N

<i>Setaria glauca</i>	Yellow Foxtail	2003	local, disturbed ground	I
<i>Sorghastrum nutans</i>	Indian Grass	2003	rare; three clumps near trail in savanna	N

## **Rushes and Other Graminoids**

### **Family: Juncaceae (Rush Family)**

<i>Juncus greenei</i>	Greene's Rush	2003	scarce, in savanna in dry soil	N
<i>Juncus tenuis</i>	Path Rush	2003	locally abundant, along trails especially	N

## **Sedges**

### **Family: Cyperaceae (Sedge Family)**

<i>Carex annectens</i>	Yellow-fruited Fox Sedge	2003	scarce, in savanna	N
<i>Carex festucacea</i>	Fescue Sedge	2003	occasional in savanna; identification not entirely certain	N
<i>Carex pensylvanica</i>	Pennsylvania Sedge	2003	locally abundant in savanna	N
<i>Carex rugosperma</i>	Sand-sedge	2003	local, near bedrock outcrops	N
<i>Carex swanii</i>	Swan's Sedge	2003	occasional in savanna	N
<i>Scirpus hattorianus</i>	Meadow Bulrush	2003	local, moist paths	N

## **Ferns and Fern Allies**

### **Family: Dennstaedtiaceae (Bracken Family)**

<i>Dennstaedtia punctilobula</i>	Hay-scented Fern	2003	local; in savanna and in young woods along western edge	N
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### **Family: Dryopteridaceae (Wood-fern Family)**

<i>Athyrium filix-femina</i>	Lady Fern	2003	rare; moist fertile young woods along western edge	N
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***Appendix B.*** Fauna checklists.

# Massachusetts Fauna: A Checklist

Location: \_\_\_\_\_

Observer(s): \_\_\_\_\_

Date(s): \_\_\_\_\_

## Amphibians

Scientific Name	Common Name	Native/Introduced	Comments
<i>Ambystomatidae (Mole Salamanders)</i>			
<input type="checkbox"/> <i>Ambystoma jeffersonianum</i>	Jefferson's Salamander	N	
<input type="checkbox"/> <i>Ambystoma laterale</i>	Blue-spotted Salamander	N	
<input type="checkbox"/> <i>Ambystoma maculata</i>	Spotted Salamander	N	
<input type="checkbox"/> <i>Ambystoma opacum</i>	Marbled Salamander	N	
<i>Bufo</i>			
<input type="checkbox"/> <i>Bufo americanus</i>	American Toad	N	
<input type="checkbox"/> <i>Bufo fowleri</i>	Fowler's Toad	N	
<i>Hyla</i>			
<input type="checkbox"/> <i>Hyla versicolor</i>	Gray Treefrog	N	
<input type="checkbox"/> <i>Pseudacris crucifer</i>	Spring Peeper	N	
<i>Pelobatidae (Spadefoot Toads)</i>			
<input type="checkbox"/> <i>Scaphiopus holbrookii</i>	Eastern Spadefoot	N	
<i>Plethodontidae (Lungless Salamanders)</i>			
<input type="checkbox"/> <i>Desmognathus fuscus</i>	Northern Dusky Salamander	N	
<input type="checkbox"/> <i>Eurycea bislineata</i>	Northern Two-lined Salamander	N	
<input type="checkbox"/> <i>Gyrinophilus porphyriticus</i>	Spring Salamander	N	
<input type="checkbox"/> <i>Hemidactylum scutatum</i>	Four-toed Salamander	N	
<input type="checkbox"/> <i>Plethodon cinereus</i>	Eastern Red-backed Salamander	N	
<i>Rana</i>			
<input type="checkbox"/> <i>Rana catesbeiana</i>	American Bullfrog	N	
<input type="checkbox"/> <i>Rana clamitans</i>	Green Frog	N	
<input type="checkbox"/> <i>Rana palustris</i>	Pickerel Frog	N	
<input type="checkbox"/> <i>Rana pipiens</i>	Northern Leopard Frog	N	
<input type="checkbox"/> <i>Rana sylvatica</i>	Wood Frog	N	
<i>Salamandridae (Newts)</i>			
<input type="checkbox"/> <i>Notophthalmus viridescens</i>	Eastern Newt	N	

## Reptiles

Scientific Name	Common Name	Native/Introduced	Comments
<i>Chelydridae (Snapping Turtles)</i>			
<input type="checkbox"/> <i>Chelydra serpentina</i>	Snapping Turtle	N	
<i>Cleloniidae (Sea Turtles)</i>			
<input type="checkbox"/> <i>Caretta caretta</i>	Loggerhead Seaturtle	N	
<input type="checkbox"/> <i>Chelonia mydas</i>	Green Seaturtle	N	
<input type="checkbox"/> <i>Lepidochelys kempii</i>	Kemp's Ridley Seaturtle	N	
<i>Colubridae (Harmless Snakes)</i>			
<input type="checkbox"/> <i>Carphophis amoenus</i>	Eastern Wormsnake	N	
<input type="checkbox"/> <i>Coluber constrictor</i>	Eastern Racer	N	
<input type="checkbox"/> <i>Diadophis punctatus</i>	Ringnecked Snake	N	
<input type="checkbox"/> <i>Elaphe obsoleta</i>	Eastern Ratsnake	N	
<input type="checkbox"/> <i>Heterodon platirhinos</i>	Eastern Hognosed Snake	N	
<input type="checkbox"/> <i>Lampropeltis triangulum</i>	Milksnake	N	
<input type="checkbox"/> <i>Nerodia sipedon</i>	Northern Watersnake	N	
<input type="checkbox"/> <i>Opheodrys vernalis</i>	Smooth Greensnake	N	
<input type="checkbox"/> <i>Storeria dekayi</i>	DeKay's Brownsnake	N	
<input type="checkbox"/> <i>Storeria occipitomaculata</i>	Red-bellied Snake	N	
<input type="checkbox"/> <i>Thamnophis sauritus</i>	Eastern Ribbonsnake	N	

<input type="checkbox"/>	<i>Thamnophis sirtalis</i>	Common Gartersnake	N	<input type="text"/>
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*Dermochelyidae (Leatherback Sea Turtle)*

<input type="checkbox"/>	<i>Dermochelys coriacea</i>	Leatherback Seaturtle	N	<input type="text"/>
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*Emydidae (Pond Turtles)*

<input type="checkbox"/>	<i>Chrysemys picta</i>	Painted Turtle	N	<input type="text"/>
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<input type="checkbox"/>	<i>Clemmys guttata</i>	Spotted Turtle	N	<input type="text"/>
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<input type="checkbox"/>	<i>Clemmys insculpta</i>	Wood Turtle	N	<input type="text"/>
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<input type="checkbox"/>	<i>Clemmys muhlenbergii</i>	Bog Turtle	N	<input type="text"/>
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<input type="checkbox"/>	<i>Emydoidea blandingii</i>	Blanding's Turtle	N	<input type="text"/>
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<input type="checkbox"/>	<i>Malaclemmys terrapin</i>	Diamond-backed Terrapin	N	<input type="text"/>
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<input type="checkbox"/>	<i>Terrapene carolina</i>	Eastern Box Turtle	N	<input type="text"/>
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*Kinosternidae (American Mud & Musk Turtles)*

<input type="checkbox"/>	<i>Sternotherus odoratus</i>	Eastern Musk Turtle	N	<input type="text"/>
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*Viperidae (Vipers & Pit Vipers)*

<input type="checkbox"/>	<i>Agkistrodon contortrix</i>	Copperhead	N	<input type="text"/>
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<input type="checkbox"/>	<i>Crotalus horridus</i>	Timber Rattlesnake	N	<input type="text"/>
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# Massachusetts Fauna: A Checklist

Location: \_\_\_\_\_

Observer(s): \_\_\_\_\_

Date(s): \_\_\_\_\_

Birds

Scientific Name	Common Name	Native/Introduced	Comments
<i>Gaviidae (Loons)</i>			
<input type="checkbox"/> <i>Gavia stellata</i>	Red-throated Loon	N Seasonal resident	
<input type="checkbox"/> <i>Gavia immer</i>	Common Loon	N Nesting, seasonal resident	
<i>Podicipedidae (Grebes)</i>			
<input type="checkbox"/> <i>Podilymbus podiceps</i>	Pied-billed Grebe	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Podiceps auritus</i>	Horned Grebe	N Seasonal resident	
<input type="checkbox"/> <i>Podiceps grisegena</i>	Red-necked Grebe	N Seasonal resident	
<i>Hydrobatidae (Storm-Petrels)</i>			
<input type="checkbox"/> <i>Oceanodroma leucorhoa</i>	Leach's Storm-Petrel	N Nesting, seasonal resident	
<i>Phalacrocoracidae (Cormorants)</i>			
<input type="checkbox"/> <i>Phalacrocorax auritus</i>	Double-crested Cormorant	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Phalacrocorax carbo</i>	Great Cormorant	N Nesting, seasonal resident	
<i>Ardeidae (Bitterns &amp; Herons)</i>			
<input type="checkbox"/> <i>Botaurus lentiginosus</i>	American Bittern	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Ixobrychus exilis</i>	Least Bittern	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Ardea herodias</i>	Great Blue Heron	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Ardea alba</i>	Great Egret	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Egretta thula</i>	Snowy Egret	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Egretta caerulea</i>	Little Blue Heron	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Bubulcus ibis</i>	Cattle Egret	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Butorides virescens</i>	Green Heron	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Nyctanassa violacea</i>	Yellow-crowned Night-Heron	N Seasonal resident	
<i>Threskiornithidae (Ibises &amp; Spoonbills)</i>			
<input type="checkbox"/> <i>Plegadis falcinellus</i>	Glossy Ibis	N Nesting, seasonal resident	
<i>Cathartidae (American Vultures)</i>			
<input type="checkbox"/> <i>Cathartes aura</i>	Turkey Vulture	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Coragyps atratus</i>	Black Vulture	N Seasonal resident	
<i>Anatidae (Geese, Swans &amp; Ducks)</i>			
<input type="checkbox"/> <i>Chen caerulescens</i>	Snow Goose	N Seasonal resident	
<input type="checkbox"/> <i>Branta canadensis</i>	Canada Goose	N Nesting, permanent resident	
<input type="checkbox"/> <i>Branta bernicla</i>	Brant	N Seasonal resident	
<input type="checkbox"/> <i>Cygnus olor</i>	Mute Swan	I Nesting, permanent resident	
<input type="checkbox"/> <i>Aix sponsa</i>	Wood Duck	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Anas strepera</i>	Gadwall	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Anas americana</i>	American Wigeon	N Seasonal resident	
<input type="checkbox"/> <i>Anas rubripes</i>	American Black Duck	N Nesting, permanent resident	
<input type="checkbox"/> <i>Anas platyrhynchos</i>	Mallard	N Nesting, permanent resident	
<input type="checkbox"/> <i>Anas discors</i>	Blue-winged Teal	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Anas clypeata</i>	Northern Shoveler	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Anas acuta</i>	Northern Pintail	N Seasonal resident	
<input type="checkbox"/> <i>Anas crecca</i>	Green-winged Teal	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Aythya valisineria</i>	Canvasback	N Seasonal resident	
<input type="checkbox"/> <i>Aythya americana</i>	Redhead	N Seasonal resident	
<input type="checkbox"/> <i>Aythya collaris</i>	Ring-necked Duck	N Seasonal resident	
<input type="checkbox"/> <i>Aythya marila</i>	Greater Scaup	N Seasonal resident	
<input type="checkbox"/> <i>Aythya affinis</i>	Lesser Scaup	N Seasonal resident	
<input type="checkbox"/> <i>Somateria mollissima</i>	Common Eider	N Nesting, seasonal resident	
<input type="checkbox"/> <i>Histrionicus histrionicus</i>	Harlequin Duck	N Seasonal resident	
<input type="checkbox"/> <i>Melanitta perspicillata</i>	Surf Scoter	N Seasonal resident	

<input type="checkbox"/>	<i>Melanitta fusca</i>	White-winged Scoter	N Seasonal resident
<input type="checkbox"/>	<i>Melanitta nigra</i>	Black Scoter	N Seasonal resident
<input type="checkbox"/>	<i>Clangula hyemalis</i>	Long-tailed Duck	N Seasonal resident
<input type="checkbox"/>	<i>Bucephala albeola</i>	Bufflehead	N Seasonal resident
<input type="checkbox"/>	<i>Bucephala clangula</i>	Common Goldeneye	N Seasonal resident
<input type="checkbox"/>	<i>Bucephala islandica</i>	Barrow's Goldeneye	N Seasonal resident
<input type="checkbox"/>	<i>Lophodytes cucullatus</i>	Hooded Merganser	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Mergus merganser</i>	Common Merganser	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Mergus serrator</i>	Red-breasted Merganser	N Seasonal resident
<input type="checkbox"/>	<i>Oxyura jamaicensis</i>	Ruddy Duck	N Nesting, seasonal resident

### *Accipitridae (Kites, Eagles & Hawks)*

<input type="checkbox"/>	<i>Pandion haliaetus</i>	Osprey	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Haliaeetus leucocephalus</i>	Bald Eagle	N Nesting, permanent resident
<input type="checkbox"/>	<i>Circus cyaneus</i>	Northern Harrier	N Nesting, permanent resident
<input type="checkbox"/>	<i>Accipiter striatus</i>	Sharp-shinned Hawk	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Accipiter cooperii</i>	Cooper's Hawk	N Nesting, permanent resident
<input type="checkbox"/>	<i>Accipiter gentilis</i>	Northern Goshawk	N Nesting, permanent resident
<input type="checkbox"/>	<i>Buteo lineatus</i>	Red-shouldered Hawk	N Nesting, permanent resident
<input type="checkbox"/>	<i>Buteo platypterus</i>	Broad-winged Hawk	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Buteo jamaicensis</i>	Red-tailed Hawk	N Nesting, permanent resident
<input type="checkbox"/>	<i>Buteo lagopus</i>	Rough-legged Hawk	N Seasonal resident
<input type="checkbox"/>	<i>Aquila chrysaetos</i>	Golden Eagle	N Seasonal resident

### *Falconidae (Falcons)*

<input type="checkbox"/>	<i>Falco sparverius</i>	American Kestrel	N Nesting, permanent resident
<input type="checkbox"/>	<i>Falco columbarius</i>	Merlin	N Seasonal resident
<input type="checkbox"/>	<i>Falco peregrinus</i>	Peregrine Falcon	N Nesting, seasonal resident

### *Phasianidae (Pheasants & Turkeys)*

<input type="checkbox"/>	<i>Phasianus colchicus</i>	Ring-necked Pheasant	I Nesting, permanent resident
<input type="checkbox"/>	<i>Bonasa umbellus</i>	Ruffed Grouse	N Nesting, permanent resident
<input type="checkbox"/>	<i>Meleagris gallopavo</i>	Wild Turkey	N Nesting, permanent resident

### *Odontophoridae (Quail)*

<input type="checkbox"/>	<i>Colinus virginianus</i>	Northern Bobwhite	N Nesting, permanent resident
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### *Rallidae (Rails, Gallinules & Coots)*

<input type="checkbox"/>	<i>Coturnicops noveboracensis</i>	Yellow Rail	N Seasonal resident
<input type="checkbox"/>	<i>Rallus longirostris</i>	Clapper Rail	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Rallus elegans</i>	King Rail	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Rallus limicola</i>	Virginia Rail	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Porzana carolina</i>	Sora	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Gallinula chloropus</i>	Common Moorhen	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Fulica americana</i>	American Coot	N Nesting, seasonal resident

### *Charadriidae (Plovers & Lapwings)*

<input type="checkbox"/>	<i>Pluvialis squatarola</i>	Black-bellied Plover	N Seasonal resident
<input type="checkbox"/>	<i>Pluvialis dominica</i>	American Golden-Plover	N Seasonal resident
<input type="checkbox"/>	<i>Charadrius semipalmatus</i>	Semipalmated Plover	N Seasonal resident
<input type="checkbox"/>	<i>Charadrius melodus</i>	Piping Plover	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Charadrius vociferus</i>	Killdeer	N Nesting, seasonal resident

### *Haematopodidae (Oystercatchers)*

<input type="checkbox"/>	<i>Haematopus palliatus</i>	American Oystercatcher	N Nesting, seasonal resident
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### *Recurvirostridae (Stilts & Avocets)*

<input type="checkbox"/>	<i>Recurvirostra americana</i>	American Avocet	N Seasonal resident
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### *Scolopacidae (Sandpipers & Allies)*

<input type="checkbox"/>	<i>Tringa melanoleuca</i>	Greater Yellowlegs	N Seasonal resident
<input type="checkbox"/>	<i>Tringa flavipes</i>	Lesser Yellowlegs	N Seasonal resident
<input type="checkbox"/>	<i>Tringa solitaria</i>	Solitary Sandpiper	N Seasonal resident
<input type="checkbox"/>	<i>Catoptrophorus semipalmatus</i>	Willet	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Actitis macularia</i>	Spotted Sandpiper	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Bartramia longicauda</i>	Upland Sandpiper	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Numenius phaeopus</i>	Wimbrel	N Seasonal resident

<input type="checkbox"/>	<i>Limosa haemastica</i>	Hudsonian Godwit	N Seasonal resident
<input type="checkbox"/>	<i>Limosa fedoa</i>	Marbled Godwit	N Seasonal resident
<input type="checkbox"/>	<i>Arenaria interpres</i>	Ruddy Turnstone	N Seasonal resident
<input type="checkbox"/>	<i>Calidris canutus</i>	Red Knot	N Seasonal resident
<input type="checkbox"/>	<i>Calidris alba</i>	Sanderling	N Seasonal resident
<input type="checkbox"/>	<i>Calidris pusilla</i>	Semipalmated Sandpiper	N Seasonal resident
<input type="checkbox"/>	<i>Calidris mauri</i>	Western Sandpiper	N Seasonal resident
<input type="checkbox"/>	<i>Calidris minutilla</i>	Least Sandpiper	N Seasonal resident
<input type="checkbox"/>	<i>Calidris fuscicollis</i>	White-rumped Sandpiper	N Seasonal resident
<input type="checkbox"/>	<i>Calidris bairdii</i>	Baird's Sandpiper	N Seasonal resident
<input type="checkbox"/>	<i>Calidris melanotos</i>	Pectoral Sandpiper	N Seasonal resident
<input type="checkbox"/>	<i>Calidris maritima</i>	Purple Sandpiper	N Seasonal resident
<input type="checkbox"/>	<i>Calidris alpina</i>	Dunlin	N Seasonal resident
<input type="checkbox"/>	<i>Calidris himantopus</i>	Stilt Sandpiper	N Seasonal resident
<input type="checkbox"/>	<i>Tryngites subruficollis</i>	Buff-breasted Sandpiper	N Seasonal resident
<input type="checkbox"/>	<i>Limnodromus griseus</i>	Short-billed Dowitcher	N Seasonal resident
<input type="checkbox"/>	<i>Limnodromus scolopaceus</i>	Long-billed Dowitcher	N Seasonal resident
<input type="checkbox"/>	<i>Gallinago gallinago</i>	Common Snipe	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Scolopax minor</i>	American Woodcock	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Phalaropus tricolor</i>	Wilson's Phalarope	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Phalaropus lobatus</i>	Red-necked Phalarope	N Seasonal resident
<input type="checkbox"/>	<i>Phalaropus fulicaria</i>	Red Phalarope	N Seasonal resident

### *Laridae (Gulls, Terns & Allies)*

<input type="checkbox"/>	<i>Larus atricilla</i>	Laughing Gull	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Larus minutus</i>	Little Gull	N Seasonal resident
<input type="checkbox"/>	<i>Larus ridibundus</i>	Black-headed Gull	N Seasonal resident
<input type="checkbox"/>	<i>Larus philadelphia</i>	Bonaparte's Gull	N Seasonal resident
<input type="checkbox"/>	<i>Larus delawarensis</i>	Ring-billed Gull	N Nesting, permanent resident
<input type="checkbox"/>	<i>Larus argentatus</i>	Herring Gull	N Nesting, permanent resident
<input type="checkbox"/>	<i>Larus glaucoides</i>	Iceland Gull	N Seasonal resident
<input type="checkbox"/>	<i>Larus hyperboreus</i>	Glaucous Gull	N Seasonal resident
<input type="checkbox"/>	<i>Larus marinus</i>	Great Black-backed Gull	N Nesting, permanent resident
<input type="checkbox"/>	<i>Xema sabini</i>	Sabine's Gull	N Seasonal resident
<input type="checkbox"/>	<i>Rissa tridactyla</i>	Black-legged Kittiwake	N Seasonal resident
<input type="checkbox"/>	<i>Sterna caspia</i>	Caspian Tern	N Seasonal resident
<input type="checkbox"/>	<i>Sterna dougallii</i>	Roseate Tern	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Sterna hirundo</i>	Common Tern	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Sterna paradisaea</i>	Arctic Tern	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Sterna antillarum</i>	Least Tern	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Chlidonias niger</i>	Black Tern	N Seasonal resident
<input type="checkbox"/>	<i>Rhynchops niger</i>	Black Skimmer	N Nesting, seasonal resident

### *Alcidae (Auks, Murres & Puffins)*

<input type="checkbox"/>	<i>Alle alle</i>	Dovekie	N Seasonal resident
<input type="checkbox"/>	<i>Uria aalga</i>	Common Murre	N Seasonal resident
<input type="checkbox"/>	<i>Uria lomvia</i>	Thick-billed Murre	N Seasonal Resident
<input type="checkbox"/>	<i>Alca torda</i>	Razorbill	N Seasonal Resident
<input type="checkbox"/>	<i>Cephus grylle</i>	Black Guillemot	N Seasonal resident
<input type="checkbox"/>	<i>Fratercula arcticus</i>	Atlantic Puffin	N Seasonal resident

### *Columbidae (Pigeons & Doves)*

<input type="checkbox"/>	<i>Columba livia</i>	Rock Dove	I Nesting, permanent resident
<input type="checkbox"/>	<i>Zenaida macroura</i>	Mourning Dove	N Nesting, permanent resident

### *Cuculidae (Cuckoos & Allies)*

<input type="checkbox"/>	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Coccyzus americanus</i>	Yellow-billed Cuckoo	N Nesting, seasonal resident

### *Tytonidae (Barn-Owls)*

<input type="checkbox"/>	<i>Tyto alba</i>	Barn Owl	N Nesting, permanent resident
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### *Strigidae (Typical Owls)*

<input type="checkbox"/>	<i>Otus asio</i>	Eastern Screech-Owl	N Nesting, permanent resident
<input type="checkbox"/>	<i>Bubo virginianus</i>	Great Horned Owl	N Nesting, permanent resident

<input type="checkbox"/>	<i>Nyctea scandiaca</i>	Snowy Owl	N Seasonal resident
<input type="checkbox"/>	<i>Strix varia</i>	Barred Owl	N Nesting, permanent resident
<input type="checkbox"/>	<i>Strix nebulosa</i>	Great Gray Owl	N Seasonal resident
<input type="checkbox"/>	<i>Asio otus</i>	Long-eared Owl	N Nesting, permanent resident
<input type="checkbox"/>	<i>Asio flammeus</i>	Short-eared Owl	N Nesting, permanent resident
<input type="checkbox"/>	<i>Aegolius funereus</i>	Boreal Owl	N Seasonal resident
<input type="checkbox"/>	<i>Aegolius acadicus</i>	Northern Saw-whet Owl	N Nesting, permanent resident
<input type="checkbox"/>	<i>Surnia ulula</i>	Northern Hawk Owl	N Seasonal resident

### Caprimulgidae (Goatsuckers)

<input type="checkbox"/>	<i>Chordeiles minor</i>	Common Nighthawk	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Caprimulgus vociferus</i>	Whip-poor-will	N Nesting, seasonal resident

### Apodidae (Swifts)

<input type="checkbox"/>	<i>Chaetura pelagica</i>	Chimney Swift	N Nesting, seasonal resident
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### Trochilidae (Hummingbirds)

<input type="checkbox"/>	<i>Archilochus colubris</i>	Ruby-throated Hummingbird	N Nesting, seasonal resident
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### Alcedinidae (Kingfishers)

<input type="checkbox"/>	<i>Ceryle alcyon</i>	Belted Kingfisher	N Nesting, permanent resident
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### Picidae (Woodpeckers)

<input type="checkbox"/>	<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Melanerpes carolinus</i>	Red-bellied Woodpecker	N Nesting, permanent resident
<input type="checkbox"/>	<i>Sphyrapicus varius</i>	Yellow-bellied Sapsucker	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Picoides pubescens</i>	Downy Woodpecker	N Nesting, permanent resident
<input type="checkbox"/>	<i>Picoides villosus</i>	Hairy Woodpecker	N Nesting, permanent resident
<input type="checkbox"/>	<i>Picoides tridactylus</i>	Three-toed Woodpecker	N Seasonal resident
<input type="checkbox"/>	<i>Picoides arcticus</i>	Black-backed Woodpecker	N Seasonal resident
<input type="checkbox"/>	<i>Colaptes auratus</i>	Northern Flicker	N Nesting, permanent resident
<input type="checkbox"/>	<i>Dryocopus pileatus</i>	Pileated Woodpecker	N Nesting, permanent resident

### Tyrannidae (Tyrant Flycatchers)

<input type="checkbox"/>	<i>Contopus cooperi</i>	Olive-sided Flycatcher	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Contopus virens</i>	Eastern Wood-Pewee	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	N Seasonal resident
<input type="checkbox"/>	<i>Empidonax virescens</i>	Acadian Flycatcher	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Empidonax alnorum</i>	Alder Flycatcher	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Empidonax trailii</i>	Willow Flycatcher	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Empidonax minimus</i>	Least Flycatcher	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Sayornis phoebe</i>	Eastern Phoebe	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Miarchus crinitus</i>	Great Crested Flycatcher	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Tyrannus tyrannus</i>	Eastern Kingbird	N Nesting, seasonal resident

### Laniidae (Shrikes)

<input type="checkbox"/>	<i>Lanius ludovicianus</i>	Loggerhead Shrike	N Seasonal resident
<input type="checkbox"/>	<i>Lanius excubitor</i>	Northern Shrike	N Seasonal resident

### Vireonidae (Vireos)

<input type="checkbox"/>	<i>Vireo griseus</i>	White-eyed Vireo	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Vireo flavifrons</i>	Yellow-throated Vireo	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Vireo solitarius</i>	Blue-headed Vireo	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Vireo gilvus</i>	Warbling Vireo	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Vireo philadelphicus</i>	Philadelphia Vireo	N Seasonal resident
<input type="checkbox"/>	<i>Vireo olivaceus</i>	Red-eyed Vireo	N Nesting, seasonal resident

### Corvidae (Jays, Magpies & Crows)

<input type="checkbox"/>	<i>Cyanocitta cristata</i>	Blue Jay	N Nesting, permanent resident
<input type="checkbox"/>	<i>Corvus brachyrhynchos</i>	American Crow	N Nesting, permanent resident
<input type="checkbox"/>	<i>Corvus ossifragus</i>	Fish Crow	N Nesting, permanent resident
<input type="checkbox"/>	<i>Corvus corax</i>	Common Raven	N Nesting, permanent resident

### Alaudidae (Larks)

<input type="checkbox"/>	<i>Eremophila alpestris</i>	Horned Lark	N Nesting, permanent resident
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### Hirundinidae (Swallows)

<input type="checkbox"/>	<i>Progne subis</i>	Purple Martin	N Nesting, seasonal resident
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<input type="checkbox"/>	<i>Stelgidopteryx serripennis</i>	Northern Rough-winged Swallow	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Tachycineta bicolor</i>	Tree Swallow	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Riparia riparia</i>	Bank Swallow	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Petrochelidon pyrrhonata</i>	Cliff Swallow	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Hirundo rustica</i>	Barn Swallow	N Nesting, seasonal resident

### Paridae (Titmice)

<input type="checkbox"/>	<i>Poecile atricapillus</i>	Black-capped Chickadee	N Nesting, permanent resident
<input type="checkbox"/>	<i>Poecile hudsonicus</i>	Boreal Chickadee	N Seasonal resident
<input type="checkbox"/>	<i>Baeolophus bicolor</i>	Tufted Titmouse	N Nesting, permanent resident

### Sittidae (Nuthatches)

<input type="checkbox"/>	<i>Sitta canadensis</i>	Red-breasted Nuthatch	N Nesting, permanent resident
<input type="checkbox"/>	<i>Sitta carolinensis</i>	White-breasted Nuthatch	N Nesting, permanent resident

### Certhiidae (Creepers)

<input type="checkbox"/>	<i>Certhia americana</i>	Brown Creeper	N Nesting, permanent resident
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### Troglodytidae (Wrens)

<input type="checkbox"/>	<i>Thryothorus ludovicianus</i>	Carolina Wren	N Nesting, permanent resident
<input type="checkbox"/>	<i>Troglodytes aedon</i>	House Wren	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Troglodytes troglodytes</i>	Winter Wren	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Cistothorus platensis</i>	Sedge Wren	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Cistothorus palustris</i>	Marsh Wren	N Nesting, seasonal resident

### Regulidae (Kinglets)

<input type="checkbox"/>	<i>Regulus satrapa</i>	Golden-crowned Kinglet	N Nesting, permanent resident
<input type="checkbox"/>	<i>Regulus calendula</i>	Ruby-crowned Kinglet	N Seasonal resident

### Sylviidae (Gnatcatchers)

<input type="checkbox"/>	<i>Poliophtila caerulea</i>	Blue-gray Gnatcatcher	N Nesting, seasonal resident
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### Turdidae (Bluebirds & Thrushes)

<input type="checkbox"/>	<i>Sialia sialis</i>	Eastern Bluebird	N Nesting, permanent resident
<input type="checkbox"/>	<i>Catharus fuscescens</i>	Veery	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Catharus minimus</i>	Gray-cheeked Thrush	N Seasonal resident
<input type="checkbox"/>	<i>Catharus bicknelli</i>	Bicknell's Thrush	N Seasonal resident
<input type="checkbox"/>	<i>Catharus ustulatus</i>	Swainson's Thrush	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Catharus guttatus</i>	Hermit Thrush	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Hylocichla mustelina</i>	Wood Thrush	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Turdus migratorius</i>	American Robin	N Nesting, permanent resident

### Mimidae (Mimic Thrushes)

<input type="checkbox"/>	<i>Dumetella carolinensis</i>	Gray Catbird	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Mimus polyglottos</i>	Northern Mockingbird	N Nesting, permanent resident
<input type="checkbox"/>	<i>Toxostoma rufum</i>	Brown Thrasher	N Nesting, seasonal resident

### Sturnidae (Starlings)

<input type="checkbox"/>	<i>Sturnus vulgaris</i>	European Starling	I Nesting, permanent resident
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### Motacillidae (Wagtails & Pipits)

<input type="checkbox"/>	<i>Anthus rubescens</i>	American Pipit	N Seasonal resident
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### Bombycillidae (Waxwings)

<input type="checkbox"/>	<i>Bombycilla cedrorum</i>	Cedar Waxwing	N Nesting, permanent resident
<input type="checkbox"/>	<i>Bombycilla garrulus</i>	Bohemian Waxwing	N Seasonal resident

### Parulidae (Wood-warblers)

<input type="checkbox"/>	<i>Vermivora pinus</i>	Blue-winged Warbler	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Vermivora chrysoptera</i>	Golden-winged Warbler	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Vermivora peregrina</i>	Tennessee Warbler	N Seasonal resident
<input type="checkbox"/>	<i>Vermivora celata</i>	Orange-crowned Warbler	N Seasonal resident
<input type="checkbox"/>	<i>Vermivora ruficapilla</i>	Nashville Warbler	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Parula americana</i>	Northern Parula	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Dendroica petechia</i>	Yellow Warbler	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Dendroica pensylvanica</i>	Chestnut-sided Warbler	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Dendroica magnolia</i>	Magnolia Warbler	N Nesting, seasonal resident
<input type="checkbox"/>	<i>Dendroica tigrina</i>	Cape May Warbler	N Seasonal resident
<input type="checkbox"/>	<i>Dendroica caerulescens</i>	Black-throated Blue Warbler	N Nesting, seasonal resident

<i>Dendroica coronata</i>	Yellow-rumped Warbler	N Nesting, permanent resident
<i>Dendroica virens</i>	Black-throated Green Warbler	N Nesting, seasonal resident
<i>Dendroica fusca</i>	Blackburnian Warbler	N Nesting, seasonal resident
<i>Dendroica pinus</i>	Pine Warbler	N Nesting, seasonal resident
<i>Dendroica discolor</i>	Prairie Warbler	N Nesting, seasonal resident
<i>Dendroica palmarum</i>	Palm Warbler	N Seasonal resident
<i>Dendroica castanea</i>	Bay-breasted Warbler	N Seasonal resident
<i>Dendroica striata</i>	Blackpoll Warbler	N Nesting, seasonal resident
<i>Dendroica cerulea</i>	Cerulean Warbler	N Nesting, seasonal resident
<i>Mniotilta varia</i>	Black-and-white Warbler	N Nesting, seasonal resident
<i>Setophaga ruticilla</i>	American Redstart	N Nesting, seasonal resident
<i>Helmitheros vermivorus</i>	Worm-eating Warbler	N Nesting, seasonal resident
<i>Seiurus aurocapillus</i>	Ovenbird	N Nesting, seasonal resident
<i>Seiurus noveboracensis</i>	Northern Waterthrush	N Nesting, seasonal resident
<i>Seiurus motacilla</i>	Louisiana Waterthrush	N Nesting, seasonal resident
<i>Oporornis agilis</i>	Connecticut Warbler	N Seasonal resident
<i>Oporornis philadelphia</i>	Mourning Warbler	N Nesting, seasonal resident
<i>Geothlypis trichas</i>	Common Yellowthroat	N Nesting, seasonal resident
<i>Wilsonia citrina</i>	Hooded Warbler	N Seasonal resident
<i>Wilsonia pusilla</i>	Wilson's Warbler	N Seasonal resident
<i>Wilsonia canadensis</i>	Canada Warbler	N Nesting, seasonal resident
<i>Icteria virens</i>	Yellow-breasted Chat	N Seasonal resident

### *Thraupidae (Tanagers)*

<i>Piranga olivacea</i>	Scarlet Tanager	N Nesting, seasonal resident
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### *Emberizidae (Sparrows & Allies)*

<i>Pipilo erythrophthalmus</i>	Eastern Towhee	N Nesting, seasonal resident
<i>Spizella arborea</i>	American Tree Sparrow	N Seasonal resident
<i>Spizella passerina</i>	Chipping Sparrow	N Nesting, seasonal resident
<i>Spizella pusilla</i>	Field Sparrow	N Nesting, seasonal resident
<i>Pooecetes gramineus</i>	Vesper Sparrow	N Nesting, seasonal resident
<i>Passerculus sandwichensis</i>	Savannah Sparrow	N Nesting, permanent resident
<i>Ammodramus savannarum</i>	Grasshopper Sparrow	N Nesting, seasonal resident
<i>Ammodramus henslowii</i>	Henslow's Sparrow	N Nesting, seasonal resident
<i>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow	N Seasonal resident
<i>Ammodramus caudacutus</i>	Saltmarsh Sharp-tailed Sparrow	N Nesting, Seasonal resident
<i>Ammodramus maritimus</i>	Seaside Sparrow	N Nesting, seasonal resident
<i>Passerella iliaca</i>	Fox Sparrow	N Seasonal resident
<i>Melospiza melodia</i>	Song Sparrow	N Nesting, permanent resident
<i>Melospiza lincolnii</i>	Lincoln's Sparrow	N Nesting, seasonal resident
<i>Melospiza georgiana</i>	Swamp Sparrow	N Nesting, seasonal resident
<i>Zonotrichia albicollis</i>	White-throated Sparrow	N Nesting, permanent resident
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow	N Seasonal resident
<i>Junco hyemalis</i>	Dark-eyed Junco	N Nesting, permanent resident
<i>Calcarius lapponicus</i>	Lapland Longspur	N Seasonal resident
<i>Plectrophenax nivalis</i>	Snow Bunting	N Seasonal resident

### *Cardinalidae (Cardinals & Allies)*

<i>Cardinalis cardinalis</i>	Northern Cardinal	N Nesting, permanent resident
<i>Pheucticus ludivicianus</i>	Rose-breasted Grosbeak	N Nesting, seasonal resident
<i>Passerina cyanea</i>	Indigo Bunting	N Nesting, seasonal resident

### *Icteridae (Blackbirds, Orioles & Allies)*

<i>Dolichonyx oryzivorus</i>	Bobolink	N Nesting, seasonal resident
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	N Nesting, seasonal resident
<i>Sturnella magna</i>	Eastern Meadowlark	N Nesting, permanent resident
<i>Euphagus carolinus</i>	Rusty Blackbird	N Nesting, seasonal resident
<i>Quiscalus quiscula</i>	Common Grackle	N Nesting, seasonal resident
<i>Molothrus ater</i>	Brown-headed Cowbird	N Nesting, seasonal resident
<i>Icterus spurius</i>	Orchard Oriole	N Nesting, seasonal resident
<i>Icterus galbula</i>	Baltimore Oriole	N Nesting, seasonal resident

### *Fringillidae (Fringilline Finches)*

<input type="checkbox"/>	<i>Pinicola enucleator</i>	Pine Grosbeak	N Seasonal resident
<input type="checkbox"/>	<i>Carpodacus purpureus</i>	Purple Finch	N Nesting, permanent resident
<input type="checkbox"/>	<i>Carpodacus mexicanus</i>	House Finch	I Nesting, permanent resident
<input type="checkbox"/>	<i>Loxia curvirostrata</i>	Red Crossbill	N Seasonal resident
<input type="checkbox"/>	<i>Loxia leucoptera</i>	White-winged Crossbill	N Seasonal resident
<input type="checkbox"/>	<i>Carduelis flammea</i>	Common Redpoll	N Seasonal resident
<input type="checkbox"/>	<i>Carduelis hornemanni</i>	Hoary Redpoll	N Seasonal resident
<input type="checkbox"/>	<i>Carduelis pinus</i>	Pine Siskin	N Seasonal resident
<input type="checkbox"/>	<i>Carduelis tristis</i>	American Goldfinch	N Nesting, permanent resident
<input type="checkbox"/>	<i>Coccothraustes vespertinus</i>	Evening Grosbeak	N Nesting, seasonal resident
<i>Passeridae (Old World Finches)</i>			
<input type="checkbox"/>	<i>Passer domesticus</i>	House Sparrow	I Nesting, permanent resident

# Massachusetts Fauna: A Checklist

Location: \_\_\_\_\_

Observer(s): \_\_\_\_\_

Date(s): \_\_\_\_\_

**Butterflies**

Scientific Name	Common Name	Native/Introduced	Comments
<i>Hesperiidae - Hesperinae (Grass Skippers)</i>			
<input type="checkbox"/> <i>Amblyscirtes hegon</i>	Pepper and Salt Skipper	N	
<input type="checkbox"/> <i>Amblyscirtes vialis</i>	Common Roadside-Skipper	N	
<input type="checkbox"/> <i>Anatrytone logan</i>	Delaware Skipper	N	
<input type="checkbox"/> <i>Ancyloxypha numitor</i>	Least Skipper	N	
<input type="checkbox"/> <i>Atalopedes campestris</i>	Sachem	N	
<input type="checkbox"/> <i>Atrytonopsis hianna</i>	Dusted Skipper	N	
<input type="checkbox"/> <i>Calpodus ethlius</i>	Brazilian Skipper		
<input type="checkbox"/> <i>Carterocephalus palaemon</i>	Arctic Skipper	N	
<input type="checkbox"/> <i>Euphyes bimacula</i>	Two-spotted Skipper	N	
<input type="checkbox"/> <i>Euphyes conspicua</i>	Black Dash	N	
<input type="checkbox"/> <i>Euphyes dion</i>	Dion Skipper	N	
<input type="checkbox"/> <i>Euphyes vestris</i>	Dun Skipper	N	
<input type="checkbox"/> <i>Hesperia attalus</i>	Dotted Skipper	N	
<input type="checkbox"/> <i>Hesperia leonardus</i>	Leonard's Skipper	N	
<input type="checkbox"/> <i>Hesperia metea</i>	Cobweb Skipper	N	
<input type="checkbox"/> <i>Hesperia sassacus</i>	Indian Skipper	N	
<input type="checkbox"/> <i>Hylephila phyleus</i>	Fiery Skipper	N	
<input type="checkbox"/> <i>Panoquina ocola</i>	Ocola Skipper		
<input type="checkbox"/> <i>Poanes hobomok</i>	Hobomok Skipper	N	
<input type="checkbox"/> <i>Poanes massasoit</i>	Mulberry Wing	N	
<input type="checkbox"/> <i>Poanes viator</i>	Broad-winged Skipper	N	
<input type="checkbox"/> <i>Poanes zabulon</i>	Zabulon Skipper	N	
<input type="checkbox"/> <i>Polites mystic</i>	Long Dash	N	
<input type="checkbox"/> <i>Polites origenes</i>	Crossline Skipper	N	
<input type="checkbox"/> <i>Polites peckius</i>	Peck's Skipper	N	
<input type="checkbox"/> <i>Polites themistocles</i>	Tawny-edged Skipper	N	
<input type="checkbox"/> <i>Pompeius verna</i>	Little Glassywing	N	
<input type="checkbox"/> <i>Thymelicus lineola</i>	European Skipper	I	
<input type="checkbox"/> <i>Wallengrenia egeremet</i>	Northern Broken-Dash	N	
<i>Hesperiidae - Pyrginae (Spread-wing Skippers)</i>			
<input type="checkbox"/> <i>Achalarus lyciades</i>	Hoary Edge	N	
<input type="checkbox"/> <i>Epargyreus clarus</i>	Silver-spotted Skipper	N	
<input type="checkbox"/> <i>Erynnis baptisiae</i>	Wild Indigo Duskywing	N	
<input type="checkbox"/> <i>Erynnis brizo</i>	Sleepy Duskywing	N	
<input type="checkbox"/> <i>Erynnis horatius</i>	Horace's Duskywing	N	
<input type="checkbox"/> <i>Erynnis icelus</i>	Dreamy Duskywing	N	
<input type="checkbox"/> <i>Erynnis juvenalis</i>	Juvenal's Duskywing	N	
<input type="checkbox"/> <i>Erynnis lucilius</i>	Columbine Duskywing	N	
<input type="checkbox"/> <i>Erynnis martialis</i>	Mottled Duskywing	N	
<input type="checkbox"/> <i>Erynnis persius</i>	Persius Duskywing	N	
<input type="checkbox"/> <i>Pergus communis</i>	Common Checkered-Skipper	N	
<input type="checkbox"/> <i>Pholisora catullus</i>	Common Sootywing	N	
<input type="checkbox"/> <i>Thorybes bathyllus</i>	Southern Cloudywing	N	
<input type="checkbox"/> <i>Thorybes pylades</i>	Northern Cloudywing	N	
<input type="checkbox"/> <i>Urbanus proteus</i>	Long-tailed Skipper	N	
<i>Lycaenidae - Lycaeninae (Coppers)</i>			
<input type="checkbox"/> <i>Lycaena epixanthe</i>	Bog Copper	N	
<input type="checkbox"/> <i>Lycaena hyllus</i>	Bronze Copper	N	
<input type="checkbox"/> <i>Lycaena phlaeas</i>	American Copper	N	
<i>Lycaenidae - Miletinae (Harvesters)</i>			

<input type="checkbox"/>	<i>Feniseca tarquinius</i>	Harvester	N	<input type="checkbox"/>
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*Lycaenidae - Polyommatae (Blues)*

<input type="checkbox"/>	<i>Celastrina "ladon"</i>	Spring Azure	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Celastrina neglecta</i>	Summer Azure	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Everes comyntas</i>	Eastern Tailed-Blue	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Glaucopsyche lygdamus</i>	Silvery Blue	N	<input type="checkbox"/>

*Lycaenidae - Theclinae (Hairstreaks)*

<input type="checkbox"/>	<i>Callophrys augustinus</i>	Brown Elfin	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Callophrys gryneus</i>	Juniper Hairstreak	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Callophrys henrici</i>	Henry's Elfin	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Callophrys hesseli</i>	Hessel's Hairstreak	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Callophrys irus</i>	Frosted Elfin	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Callophrys niphon</i>	Eastern Pine Elfin	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Callophrys polios</i>	Hoary Elfin	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Erora laeta</i>	Early Hairstreak	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Fixsenia favonius</i>	Southern Hairstreak	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Parrhasius m-album</i>	White M Hairstreak	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Satyrrium acadica</i>	Acadian Hairstreak	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Satyrrium calanus</i>	Banded Hairstreak	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Satyrrium caryaevorum</i>	Hickory Hairstreak	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Satyrrium edwardsii</i>	Edwards' Hairstreak	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Satyrrium liparops</i>	Striped Hairstreak	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Satyrrium titus</i>	Coral Hairstreak	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Strymon melinus</i>	Gray Hairstreak	N	<input type="checkbox"/>

*Nymphalidae - Apaturinae (Emperors)*

<input type="checkbox"/>	<i>Asterocampa celtis</i>	Hackberry Emperor	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Asterocampa clyton</i>	Tawny Emperor	N	<input type="checkbox"/>

*Nymphalidae - Danainae (Monarchs)*

<input type="checkbox"/>	<i>Danaus plexippus</i>	Monarch	N	<input type="checkbox"/>
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*Nymphalidae - Heliconiinae (Fritillaries)*

<input type="checkbox"/>	<i>Boloria bellona</i>	Meadow Fritillary	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Boloria selene</i>	Silver-bordered Fritillary	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Euptoieta claudia</i>	Variiegated Fritillary	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Speyeria aphrodite</i>	Aphrodite Fritillary	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Speyeria atlantis</i>	Atlantis Fritillary	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Speyeria cybele</i>	Great Spangled Fritillary	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Speyeria idalia</i>	Regal Fritillary	N	<input type="checkbox"/>

*Nymphalidae - Libytheinae (Snouts)*

<input type="checkbox"/>	<i>Libytheana carinenta</i>	American Snout	N	<input type="checkbox"/>
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*Nymphalidae - Limenitidinae (Admirals & Relatives)*

<input type="checkbox"/>	<i>Limenitis archippus</i>	Viceroy	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Limenitis arthemis</i>	Red-spotted Purple	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Limenitis arthemis arthemis</i>	White Admiral	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Limenitis arthemis astyanax</i>	'Astyanax' Red-spotted Purple	N	<input type="checkbox"/>

*Nymphalidae - Nymphalinae (True Brush-foots)*

<input type="checkbox"/>	<i>Anartia jatrophae</i>	White Peacock	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Chlosyne harrisii</i>	Harris' Checkerspot	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Chlosyne nycteis</i>	Silvery Checkerspot	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Euphydryas phaeton</i>	Baltimore	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Junonia coenia</i>	Common Buckeye	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Nymphalis antiopa</i>	Mourning Cloak	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Nymphalis milberti</i>	Milbert's Tortoiseshell	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Nymphalis urticae</i>	Small Tortoiseshell	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Nymphalis vaualbum</i>	Compton Tortoiseshell	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Phyciodes cocyta</i>	Northern Crescent	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Phyciodes tharos</i>	Pearl Crescent	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Polygonia comma</i>	Eastern Comma	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Polygonia faunus</i>	Green Comma	N	<input type="checkbox"/>

<input type="checkbox"/>	<i>Polygonia interrogationis</i>	Question Mark	N	<input type="text"/>
<input type="checkbox"/>	<i>Polygonia progne</i>	Gray Comma	N	<input type="text"/>
<input type="checkbox"/>	<i>Vanessa atalanta</i>	Red Admiral	N	<input type="text"/>
<input type="checkbox"/>	<i>Vanessa cardui</i>	Painted Lady	N	<input type="text"/>
<input type="checkbox"/>	<i>Vanessa virginiensis</i>	American Lady	N	<input type="text"/>

*Nymphalidae - Satyrinae (Satyrs)*

<input type="checkbox"/>	<i>Cercyonis pegala</i>	Common Wood Nymph	N	<input type="text"/>
<input type="checkbox"/>	<i>Coenonympha tullia</i>	Common Ringlet	N	<input type="text"/>
<input type="checkbox"/>	<i>Enodia anthedon</i>	Northern Pearly Eye	N	<input type="text"/>
<input type="checkbox"/>	<i>Megisto cymela</i>	Little Wood Satyr	N	<input type="text"/>
<input type="checkbox"/>	<i>Satyrodes appalachia</i>	Appalachian Brown	N	<input type="text"/>
<input type="checkbox"/>	<i>Satyrodes eurydice</i>	Eyed Brown	N	<input type="text"/>

*Papilionidae - Papilioninae (Swallowtails)*

<input type="checkbox"/>	<i>Battus philenor</i>	Pipevine Swallowtail	N	<input type="text"/>
<input type="checkbox"/>	<i>Eurytides marcellus</i>	Zebra Swallowtail	N	<input type="text"/>
<input type="checkbox"/>	<i>Papilio canadensis</i>	Canadian Tiger Swallowtail	N	<input type="text"/>
<input type="checkbox"/>	<i>Papilio cresphontes</i>	Giant Swallowtail	N	<input type="text"/>
<input type="checkbox"/>	<i>Papilio glaucus</i>	Eastern Tiger Swallowtail	N	<input type="text"/>
<input type="checkbox"/>	<i>Papilio polyxenes</i>	Black Swallowtail	N	<input type="text"/>
<input type="checkbox"/>	<i>Papilio troilus</i>	Spicebush Swallowtail	N	<input type="text"/>

*Pieridae - Coliadinae (Sulphurs)*

<input type="checkbox"/>	<i>Colias eurytheme</i>	Orange Sulphur	N	<input type="text"/>
<input type="checkbox"/>	<i>Colias interior</i>	Pink-edged Sulphur	N	<input type="text"/>
<input type="checkbox"/>	<i>Colias philodice</i>	Clouded Sulphur	N	<input type="text"/>
<input type="checkbox"/>	<i>Eurema lisa</i>	Little Yellow	N	<input type="text"/>
<input type="checkbox"/>	<i>Eurema nicippe</i>	Sleepy Orange	N	<input type="text"/>
<input type="checkbox"/>	<i>Phoebis sennae</i>	Cloudless Sulphur	N	<input type="text"/>

*Pieridae - Pierinae (Whites)*

<input type="checkbox"/>	<i>Anthocharis midea</i>	Falcate Orangetip	N	<input type="text"/>
<input type="checkbox"/>	<i>Pieris oleracea</i>	Mustard White	N	<input type="text"/>
<input type="checkbox"/>	<i>Pieris rapae</i>	Cabbage White	I	<input type="text"/>
<input type="checkbox"/>	<i>Pieris virginiensis</i>	West Virginia White	N	<input type="text"/>
<input type="checkbox"/>	<i>Pontia protodice</i>	Checkered White	N	<input type="text"/>

# Massachusetts Fauna: A Checklist

Location: \_\_\_\_\_

Observer(s): \_\_\_\_\_

Date(s): \_\_\_\_\_

**Damselflies**

Scientific Name	Common Name	Native/Introduced	Comments
<i>Calopterygidae (Broad-winged Damselflies)</i>			
<input type="checkbox"/> <i>Calopteryx aequabilis</i>	River Jewelwing	N	
<input type="checkbox"/> <i>Calopteryx amata</i>	Superb Jewelwing	N	
<input type="checkbox"/> <i>Calopteryx dimidiata</i>	Sparkling Jewelwing	N	
<input type="checkbox"/> <i>Calopteryx maculata</i>	Ebony Jewelwing	N	
<input type="checkbox"/> <i>Hetaerina americana</i>	American Rubyspot	N	

Scientific Name	Common Name	Native/Introduced	Comments
<i>Coenagrionidae (Narrow-winged Damselflies)</i>			
<input type="checkbox"/> <i>Amphiagrion saucium</i>	Eastern Red Damsel	N	
<input type="checkbox"/> <i>Argia apicalis</i>	Blue-fronted Dancer	N	
<input type="checkbox"/> <i>Argia fumipennis</i>	Variable Dancer	N	
<input type="checkbox"/> <i>Argia moesta</i>	Powdered Dancer	N	
<input type="checkbox"/> <i>Argia translata</i>	Dusky Dancer	N	
<input type="checkbox"/> <i>Chromagrion conditum</i>	Aurora Damsel	N	
<input type="checkbox"/> <i>Coenagrion resolutum</i>	Taiga Bluet	N	
<input type="checkbox"/> <i>Enallagma aspersum</i>	Azure Bluet	N	
<input type="checkbox"/> <i>Enallagma boreale</i>	Boreal Bluet	N	
<input type="checkbox"/> <i>Enallagma carunculatum</i>	Tule Bluet	N	
<input type="checkbox"/> <i>Enallagma civile</i>	Familiar Bluet	N	
<input type="checkbox"/> <i>Enallagma cyathigerum</i>	Northern Bluet	N	
<input type="checkbox"/> <i>Enallagma daeckii</i>	Attenuated Bluet	N	
<input type="checkbox"/> <i>Enallagma divagans</i>	Turquoise Bluet	N	
<input type="checkbox"/> <i>Enallagma doubledayi</i>	Atlantic Bluet	N	
<input type="checkbox"/> <i>Enallagma durum</i>	Big Bluet	N	
<input type="checkbox"/> <i>Enallagma ebrium</i>	Marsh Bluet	N	
<input type="checkbox"/> <i>Enallagma exsulans</i>	Stream Bluet	N	
<input type="checkbox"/> <i>Enallagma geminatum</i>	Skimming Bluet	N	
<input type="checkbox"/> <i>Enallagma hageni</i>	Hagen's Bluet	N	
<input type="checkbox"/> <i>Enallagma laterale</i>	New England Bluet	N	
<input type="checkbox"/> <i>Enallagma minusculum</i>	Little Bluet	N	
<input type="checkbox"/> <i>Enallagma pictum</i>	Scarlet Bluet	N	
<input type="checkbox"/> <i>Enallagma recurvatum</i>	Pine Barrens Bluet	N	
<input type="checkbox"/> <i>Enallagma signatum</i>	Orange Bluet	N	
<input type="checkbox"/> <i>Enallagma traviatum</i>	Slender Bluet	N	
<input type="checkbox"/> <i>Enallagma vesperum</i>	Vesper Bluet	N	
<input type="checkbox"/> <i>Ischnura hastata</i>	Citrine Forktail	N	
<input type="checkbox"/> <i>Ischnura kellicotti</i>	Lilypad Forktail	N	
<input type="checkbox"/> <i>Ischnura posita</i>	Fragile Forktail	N	
<input type="checkbox"/> <i>Ischnura prognata</i>	Furtive Forktail	N	
<input type="checkbox"/> <i>Ischnura ramburii</i>	Rambur's Forktail	N	
<input type="checkbox"/> <i>Ischnura verticalis</i>	Eastern Forktail	N	
<input type="checkbox"/> <i>Nehalennia gracilis</i>	Sphagnum Sprite	N	
<input type="checkbox"/> <i>Nehalennia irene</i>	Sedge Sprite	N	

Scientific Name	Common Name	Native/Introduced	Comments
<i>Lestidae (Spread-winged Damselflies)</i>			
<input type="checkbox"/> <i>Lestes congener</i>	Spotted Spreadwing	N	
<input type="checkbox"/> <i>Lestes disjunctus</i>	Common Spreadwing	N	
<input type="checkbox"/> <i>Lestes dryas</i>	Emerald Spreadwing	N	
<input type="checkbox"/> <i>Lestes eurinus</i>	Amber-winged Spreadwing	N	
<input type="checkbox"/> <i>Lestes forcipatus</i>	Sweetflag Spreadwing	N	
<input type="checkbox"/> <i>Lestes inaequalis</i>	Elegant Spreadwing	N	
<input type="checkbox"/> <i>Lestes rectangularis</i>	Slender Spreadwing	N	
<input type="checkbox"/> <i>Lestes unguiculatus</i>	Lyre-tipped Spreadwing	N	
<input type="checkbox"/> <i>Lestes vigilax</i>	Swamp Spreadwing	N	

# Massachusetts Fauna: A Checklist

Location: \_\_\_\_\_

Observer(s): \_\_\_\_\_

Date(s): \_\_\_\_\_

**Dragonflies**

Scientific Name	Common Name	Native/Introduced	Comments
<i>Aeshnidae (Darners)</i>			
<input type="checkbox"/> <i>Aeshna canadensis</i>	Canada Darner	N	
<input type="checkbox"/> <i>Aeshna clepsydra</i>	Mottled Darner	N	
<input type="checkbox"/> <i>Aeshna constricta</i>	Lance-tipped Darner	N	
<input type="checkbox"/> <i>Aeshna eremita</i>	Lake Darner	N	
<input type="checkbox"/> <i>Aeshna interrupta</i>	Variable Darner	N	
<input type="checkbox"/> <i>Aeshna multicolor</i>	Blue-eyed Darner	N	
<input type="checkbox"/> <i>Aeshna mutata</i>	Spatardock Darner	N	
<input type="checkbox"/> <i>Aeshna subarctica</i>	Subarctic Darner	N	
<input type="checkbox"/> <i>Aeshna tuberculifera</i>	Black-tipped Darner	N	
<input type="checkbox"/> <i>Aeshna umbrosa</i>	Shadow Darner	N	
<input type="checkbox"/> <i>Aeshna verticalis</i>	Green-striped Darner	N	
<input type="checkbox"/> <i>Anax junius</i>	Common Green Darner	N	
<input type="checkbox"/> <i>Anax longipes</i>	Comet Darner	N	
<input type="checkbox"/> <i>Basiaeschna janata</i>	Springtime Darner	N	
<input type="checkbox"/> <i>Boyeria grafiana</i>	Ocellated Darner	N	
<input type="checkbox"/> <i>Boyeria vinosa</i>	Fawn Darner	N	
<input type="checkbox"/> <i>Epiaeschna heros</i>	Swamp Darner	N	
<input type="checkbox"/> <i>Gomphaeschna antilope</i>	Taper-tailed Darner	N	
<input type="checkbox"/> <i>Gomphaeschna furcillata</i>	Harlequin Darner	N	
<input type="checkbox"/> <i>Nasiaeschna pentacantha</i>	Cyrano Darner	N	
<i>Cordulegastridae (Spiketails)</i>			
<input type="checkbox"/> <i>Cordulegaster diastatops</i>	Delta-spotted Spiketail	N	
<input type="checkbox"/> <i>Cordulegaster maculata</i>	Twin-spotted Spiketail	N	
<input type="checkbox"/> <i>Cordulegaster obliqua</i>	Arrowhead Spiketail	N	
<i>Corduliidae (Emeralds)</i>			
<input type="checkbox"/> <i>Cordulia shurtleffi</i>	American Emerald	N	
<input type="checkbox"/> <i>Dorocordulia lepida</i>	Petite Emerald	N	
<input type="checkbox"/> <i>Dorocordulia libera</i>	Racket-tailed Emerald	N	
<input type="checkbox"/> <i>Epiptera canis</i>	Beaverpond Baskettail	N	
<input type="checkbox"/> <i>Epiptera cynosura</i>	Common Baskettail	N	
<input type="checkbox"/> <i>Epiptera princeps</i>	Prince Baskettail	N	
<input type="checkbox"/> <i>Epiptera spinigera</i>	Spiny Baskettail	N	
<input type="checkbox"/> <i>Helocordulia uhleri</i>	Uhler's Sundragon	N	
<input type="checkbox"/> <i>Neurocordulia obsoleta</i>	Umber Shadowdragon	N	
<input type="checkbox"/> <i>Neurocordulia yamaskanensis</i>	Stygian Shadowdragon	N	
<input type="checkbox"/> <i>Somatochlora cingulata</i>	Lake Emerald	N	
<input type="checkbox"/> <i>Somatochlora elongata</i>	Ski-tailed Emerald	N	
<input type="checkbox"/> <i>Somatochlora forcipata</i>	Forcipate Emerald	N	
<input type="checkbox"/> <i>Somatochlora georgiana</i>	Coppery Emerald	N	
<input type="checkbox"/> <i>Somatochlora incurvata</i>	Incurvate Emerald	N	
<input type="checkbox"/> <i>Somatochlora kennedyi</i>	Kennedy's Emerald	N	
<input type="checkbox"/> <i>Somatochlora linearis</i>	Mocha Emerald	N	
<input type="checkbox"/> <i>Somatochlora minor</i>	Ocellated Emerald	N	
<input type="checkbox"/> <i>Somatochlora tenebrosa</i>	Clamp-tipped Emerald	N	
<input type="checkbox"/> <i>Somatochlora walshii</i>	Brush-tipped Emerald	N	
<input type="checkbox"/> <i>Somatochlora williamsoni</i>	Williamson's Emerald	N	
<input type="checkbox"/> <i>Williamsonia fletcheri</i>	Ebony Boghaunter	N	
<input type="checkbox"/> <i>Williamsonia lintneri</i>	Ringed Boghaunter	N	
<i>Gomphidae (Clubtails)</i>			
<input type="checkbox"/> <i>Argomphus furcifer</i>	Lilypad Clubtail	N	

	<i>Arigomphus villosipes</i>	Unicorn Clubtail	N	
	<i>Dromogomphus spinosus</i>	Black-shouldered Spinyleg	N	
	<i>Gomphus abbreviatus</i>	Spine-crowned Clubtail	N	
	<i>Gomphus adelphus</i>	Moustached Clubtail	N	
	<i>Gomphus borealis</i>	Beaverpond Clubtail	N	
	<i>Gomphus descriptus</i>	Harpoon Clubtail	N	
	<i>Gomphus exilis</i>	Lancet Clubtail	N	
	<i>Gomphus fraternus</i>	Midland Clubtail	N	
	<i>Gomphus lividus</i>	Ashy Clubtail	N	
	<i>Gomphus quadricolor</i>	Rapids Clubtail	N	
	<i>Gomphus spicatus</i>	Dusky Clubtail	N	
	<i>Gomphus vastus</i>	Cobra Clubtail	N	
	<i>Gomphus ventricosus</i>	Skillet Clubtail	N	
	<i>Hagenius brevistylus</i>	Dragonhunter	N	
	<i>Lanthus parvulus</i>	Northern Pygmy Clubtail	N	
	<i>Lanthus vernalis</i>	Southern Pygmy Clubtail	N	
	<i>Ophiogomphus aspersus</i>	Brook Snaketail	N	
	<i>Ophiogomphus carolus</i>	Riffle Snaketail	N	
	<i>Ophiogomphus howei</i>	Pygmy Snaketail	N	
	<i>Ophiogomphus mainensis</i>	Maine Snaketail	N	
	<i>Ophiogomphus rupinsulensis</i>	Rusty Snaketail	N	
	<i>Progomphus obscurus</i>	Common Sanddragon	N	
	<i>Stylogomphus albistylus</i>	Least Clubtail	N	
	<i>Stylurus amnicola</i>	Riverine Clubtail	N	
	<i>Stylurus scudderi</i>	Zebra Clubtail	N	
	<i>Stylurus spiniceps</i>	Arrow Clubtail	N	

### *Libellulidae (Common Skimmers)*

	<i>Celithemis elisa</i>	Calico Pennant	N	
	<i>Celithemis eponina</i>	Halloween Pennant	N	
	<i>Celithemis fasciata</i>	Banded Pennant	N	
	<i>Celithemis martha</i>	Martha's Pennant	N	
	<i>Erythemis simplicicollis</i>	Eastern Pondhawk	N	
	<i>Erythrodiplax berenice</i>	Seaside Dragonlet	N	
	<i>Leucorrhinia frigida</i>	Frosted Whiteface	N	
	<i>Leucorrhinia glacialis</i>	Crimson-ringed Whiteface	N	
	<i>Leucorrhinia hudsonica</i>	Hudsonian Whiteface	N	
	<i>Leucorrhinia intacta</i>	Dot-tailed Whiteface	N	
	<i>Leucorrhinia proxima</i>	Red-waisted Whiteface	N	
	<i>Libellula auripennis</i>	Golden-winged Skimmer	N	
	<i>Libellula axilena</i>	Bar-winged Skimmer	N	
	<i>Libellula cyanea</i>	Spangled Skimmer	N	
	<i>Libellula deplanata</i>	Blue Corporal	N	
	<i>Libellula exusta</i>	White Corporal	N	
	<i>Libellula incesta</i>	Slaty Skimmer	N	
	<i>Libellula julia</i>	Chalk-fronted Skimmer	N	
	<i>Libellula luctuosa</i>	Widow Skimmer	N	
	<i>Libellula lydia</i>	Common Whitetail	N	
	<i>Libellula needhami</i>	Needham's Skimmer	N	
	<i>Libellula pulchella</i>	Twelve-spotted Skimmer	N	
	<i>Libellula quadrimaculata</i>	Four-spotted Skimmer	N	
	<i>Libellula semifasciata</i>	Painted Skimmer	N	
	<i>Libellula vibrans</i>	Great Blue Skimmer	N	
	<i>Nannothemis bella</i>	Elfin Skimmer	N	
	<i>Pachydiplax longipennis</i>	Blue Dasher	N	
	<i>Pantala flavescens</i>	Wandering Glider	N	
	<i>Pantala hymenaea</i>	Spot-winged Glider	N	
	<i>Perithemis tenera</i>	Eastern Amberwing	N	
	<i>Sympetrum corruptum</i>	Variiegated Meadowhawk	N	
	<i>Sympetrum costiferum</i>	Saffron-winged Meadowhawk	N	
	<i>Sympetrum internum</i>	Cherry-faced Meadowhawk	N	
	<i>Sympetrum obtrusum</i>	White-faced Meadowhawk	N	

<input type="checkbox"/>	<i>Sympetrum rubicundulum</i>	Ruby Meadowhawk	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Sympetrum semicinctum</i>	Band-winged Meadowhawk	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Sympetrum vicinum</i>	Yellow-legged Meadowhawk	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Tamea abdominalis</i>	Vermilion Saddlebags	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Tamea calverti</i>	Striped Glider	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Tamea carolina</i>	Carolina Saddlebags	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Tamea lacerata</i>	Black Saddlebags	N	<input type="checkbox"/>

*Macromiidae (Belted and River Cruisers)*

<input type="checkbox"/>	<i>Didymops transversa</i>	Stream Cruiser	N	<input type="checkbox"/>
<input type="checkbox"/>	<i>Macromia illinoisensis</i>	Illinois River Cruiser	N	<input type="checkbox"/>

# Massachusetts Fauna: A Checklist

Location: \_\_\_\_\_

Observer(s): \_\_\_\_\_

Date(s): \_\_\_\_\_

**Fish**

Scientific Name	Common Name	Native/Introduced	Comments
<i>Acipenseridae (Sturgeons)</i>			
<input type="checkbox"/> <i>Acipenser brevirostrum</i>	Shortnose Sturgeon	N	
<input type="checkbox"/> <i>Acipenser oxyrinchus</i>	Atlantic Sturgeon	N	
<i>Amiidae (Bowfins)</i>			
<input type="checkbox"/> <i>Amia calva</i>	Bowfin	I	
<i>Anguillidae (Freshwater Eels)</i>			
<input type="checkbox"/> <i>Anguilla rostrata</i>	American Eel	N	
<i>Archiridae (American Soles)</i>			
<input type="checkbox"/> <i>Trinectes maculatus</i>	Hogchoker	N	
<i>Atherinopsidae (Silversides)</i>			
<input type="checkbox"/> <i>Menidia beryllina</i>	Inland Silverside	N	
<input type="checkbox"/> <i>Menidia menidia</i>	Atlantic Silverside	N	
<i>Belonidae (Needlefishes)</i>			
<input type="checkbox"/> <i>Strongylura marina</i>	Atlantic Needlefish	N	
<i>Carangidae (Jacks)</i>			
<input type="checkbox"/> <i>Caranx hippos</i>	Crevalle Jack	N	
<i>Catostomidae (Suckers)</i>			
<input type="checkbox"/> <i>Catostomus catostomus</i>	Longnose Sucker	N	
<input type="checkbox"/> <i>Catostomus commersoni</i>	White Sucker	N	
<input type="checkbox"/> <i>Erimyzon oblongus</i>	Creek Chubsucker	N	
<i>Centrarchidae (Sunfishes and Black Basses)</i>			
<input type="checkbox"/> <i>Ambloplites rupestris</i>	Rock Bass	I	
<input type="checkbox"/> <i>Enneacanthus obesus</i>	Banded Sunfish	N	
<input type="checkbox"/> <i>Lepomis auritus</i>	Redbreast Sunfish	N	
<input type="checkbox"/> <i>Lepomis cyanellus</i>	Green Sunfish	I	
<input type="checkbox"/> <i>Lepomis gibbosus</i>	Pumpkinseed	N	
<input type="checkbox"/> <i>Lepomis macrochirus</i>	Bluegill	I	
<input type="checkbox"/> <i>Micropterus dolomieu</i>	Smallmouth Bass	I	
<input type="checkbox"/> <i>Micropterus salmoides</i>	Largemouth Bass	I	
<input type="checkbox"/> <i>Pomoxis annularis</i>	White Crappie	I	
<input type="checkbox"/> <i>Pomoxis nigromaculatus</i>	Black Crappie	I	
<i>Clupeidae (Herrings)</i>			
<input type="checkbox"/> <i>Alosa aestivalis</i>	Blueback Herring	N	
<input type="checkbox"/> <i>Alosa pseudoharengus</i>	Alewife	N	
<input type="checkbox"/> <i>Alosa sapidissima</i>	American Shad	N	
<input type="checkbox"/> <i>Dorosoma cepedianum</i>	Gizzard Shad	N	
<i>Cottidae (Sculpins)</i>			
<input type="checkbox"/> <i>Cottus cognatus</i>	Slimy Sculpin	N	
<i>Cyprinidae (Carp and Minnows)</i>			
<input type="checkbox"/> <i>Carassius auratus</i>	Goldfish	I	
<input type="checkbox"/> <i>Couesius plumbeus</i>	Lake Chub	N	
<input type="checkbox"/> <i>Cyprinus carpio</i>	Common Carp	I	
<input type="checkbox"/> <i>Hybognathus regius</i>	Eastern Silvery Minnow	N	
<input type="checkbox"/> <i>Luxilus cornutus</i>	Common Shiner	N	
<input type="checkbox"/> <i>Notemigonus crysoleucas</i>	Golden Shiner	N	
<input type="checkbox"/> <i>Notropis bifrenatus</i>	Bridle Shiner	N	
<input type="checkbox"/> <i>Notropis hudsonius</i>	Spottail Shiner	N	
<input type="checkbox"/> <i>Notropis volucellus</i>	Mimic Shiner	I	
<input type="checkbox"/> <i>Phoxinus eos</i>	Northern Redbelly Dace	N	

<input type="checkbox"/>	<i>Pimephales notatus</i>	Bluntnose Minnow	I	<input type="text"/>
<input type="checkbox"/>	<i>Pimephales promelas</i>	Fathead Minnow	I	<input type="text"/>
<input type="checkbox"/>	<i>Rhinichthys atratulus</i>	Blacknose Dace	N	<input type="text"/>
<input type="checkbox"/>	<i>Rhinichthys cataractae</i>	Longnose Dace	N	<input type="text"/>
<input type="checkbox"/>	<i>Scardinius erythrophthalmus</i>	Rudd	I	<input type="text"/>
<input type="checkbox"/>	<i>Semotilus corporalis</i>	Fallfish	N	<input type="text"/>
<input type="checkbox"/>	<i>Semotilus atromaculatus</i>	Creek Chub	N	<input type="text"/>

*Cyprinodontidae (Pupfishes)*

<input type="checkbox"/>	<i>Cyprinodon variegatus</i>	Sheepshead Minnow	N	<input type="text"/>
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*Engraulidae (Anchovies)*

<input type="checkbox"/>	<i>Anchoa mitchilli</i>	Bay Anchovy	N	<input type="text"/>
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*Esocidae (Pikes and Pickerels)*

<input type="checkbox"/>	<i>Esox americanus</i>	Redfin Pickerel	N	<input type="text"/>
<input type="checkbox"/>	<i>Esox lucius</i>	Northern Pike	I	<input type="text"/>
<input type="checkbox"/>	<i>Esox niger</i>	Chain Pickerel	N	<input type="text"/>

*Fundulidae (Killifishes)*

<input type="checkbox"/>	<i>Fundulus diaphanus</i>	Banded Killifish	N	<input type="text"/>
<input type="checkbox"/>	<i>Fundulus heteroclitus</i>	Mummichog	N	<input type="text"/>
<input type="checkbox"/>	<i>Fundulus luciae</i>	Spotfin Killifish	N	<input type="text"/>
<input type="checkbox"/>	<i>Lucania parva</i>	Rainwater Killifish	N	<input type="text"/>

*Gadidae (Codfishes)*

<input type="checkbox"/>	<i>Microgadus tomcod</i>	Atlantic Tomcod	N	<input type="text"/>
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*Gasterosteidae (Sticklebacks)*

<input type="checkbox"/>	<i>Apeltes quadracus</i>	Fourspine Stickleback	N	<input type="text"/>
<input type="checkbox"/>	<i>Gasterosteus aculeatus</i>	Threespine Stickleback	N	<input type="text"/>
<input type="checkbox"/>	<i>Gasterosteus wheatlandi</i>	Blackspotted Stickleback	N	<input type="text"/>
<input type="checkbox"/>	<i>Pungitius pungitius</i>	Ninespine Stickleback	N	<input type="text"/>

*Ictaluridae (Bullhead Catfishes)*

<input type="checkbox"/>	<i>Ameiurus catus</i>	White Catfish	I	<input type="text"/>
<input type="checkbox"/>	<i>Ameiurus natalis</i>	Yellow Bullhead	I	<input type="text"/>
<input type="checkbox"/>	<i>Ameiurus nebulosus</i>	Brown Bullhead	N	<input type="text"/>
<input type="checkbox"/>	<i>Ictalurus punctatus</i>	Channel Catfish	I	<input type="text"/>
<input type="checkbox"/>	<i>Noturus gyrinus</i>	Tadpole Madtom	I	<input type="text"/>
<input type="checkbox"/>	<i>Noturus insignis</i>	Margined Madtom	I	<input type="text"/>

*Moronidae (Striped Basses)*

<input type="checkbox"/>	<i>Morone americana</i>	White Perch	N	<input type="text"/>
<input type="checkbox"/>	<i>Morone saxatilis</i>	Striped Bass	N	<input type="text"/>

*Mugilidae (Mulletts)*

<input type="checkbox"/>	<i>Mugil cephalus</i>	Striped Mullet	N	<input type="text"/>
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*Osmeridae (Smelt)*

<input type="checkbox"/>	<i>Osmerus mordax</i>	Rainbow Smelt	N	<input type="text"/>
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*Percidae (Perches)*

<input type="checkbox"/>	<i>Etheostoma fusiforme</i>	Swamp Darter	N	<input type="text"/>
<input type="checkbox"/>	<i>Etheostoma olmstedii</i>	Tessellated Darter	N	<input type="text"/>
<input type="checkbox"/>	<i>Perca flavescens</i>	Yellow Perch	N	<input type="text"/>
<input type="checkbox"/>	<i>Stizostedion vitreum</i>	Walleye	I	<input type="text"/>

*Petromyzontidae (Lampreys)*

<input type="checkbox"/>	<i>Lampetra appendix</i>	American Brook Lamprey	N	<input type="text"/>
<input type="checkbox"/>	<i>Petromyzon marinus</i>	Sea Lamprey	N	<input type="text"/>

*Salmonidae (Salmon, Chars & Trout)*

<input type="checkbox"/>	<i>Oncorhynchus mykiss</i>	Rainbow Trout	I	<input type="text"/>
<input type="checkbox"/>	<i>Salmo salar</i>	Atlantic Salmon	N/I	<input type="text"/>
<input type="checkbox"/>	<i>Salmo trutta</i>	Brown Trout	I	<input type="text"/>
<input type="checkbox"/>	<i>Salvelinus fontinalis</i>	Brook Trout	N	<input type="text"/>
<input type="checkbox"/>	<i>Salvelinus namaycush</i>	Lake Trout	I	<input type="text"/>

*Syngnathidae (Pipefishes)*

*Syngnathus fuscus*  
*Umbridae (Mudminnows)*

Northern Pipefish

N

*Umbra limi*

Central Mudminnow

I

# Massachusetts Fauna: A Checklist

Location: \_\_\_\_\_

Observer(s): \_\_\_\_\_

Date(s): \_\_\_\_\_

**Mammals**

Scientific Name	Common Name	Native/Introduced	Comments
<i>Canidae (Dogs, Foxes &amp; Wolves)</i>			
<input type="checkbox"/> <i>Canis latrans</i>	Coyote	N	
<input type="checkbox"/> <i>Urocyon cinereoargenteus</i>	Common Gray Fox	N	
<input type="checkbox"/> <i>Vulpes vulpes</i>	Red Fox	N	
<i>Castoridae (Beavers)</i>			
<input type="checkbox"/> <i>Castor canadensis</i>	American Beaver	N	
<i>Cervidae (Deer, Elk &amp; Moose)</i>			
<input type="checkbox"/> <i>Alces alces</i>	Moose	N	
<input type="checkbox"/> <i>Odocoileus virginianus</i>	White-tailed Deer	N	
<i>Didelphidae (New World Opossums)</i>			
<input type="checkbox"/> <i>Didelphis virginiana</i>	Virginia Opossum	N	
<i>Erethizontidae (New World Porcupines)</i>			
<input type="checkbox"/> <i>Erethizon dorsatum</i>	Common Porcupine	N	
<i>Felidae (Cats)</i>			
<input type="checkbox"/> <i>Felis catus</i>	Domestic Cat	I	
<input type="checkbox"/> <i>Lynx rufus</i>	Bobcat	N	
<i>Leporidae (Hares &amp; Rabbits)</i>			
<input type="checkbox"/> <i>Lepus americanus</i>	Snowshoe Hare	N	
<input type="checkbox"/> <i>Lepus californicus</i>	Black-tailed Jackrabbit	I	
<input type="checkbox"/> <i>Sylvilagus floridanus</i>	Eastern Cottontail	I	
<input type="checkbox"/> <i>Sylvilagus transitionalis</i>	New England Cottontail	N	
<i>Mephitidae (Skunks)</i>			
<input type="checkbox"/> <i>Mephitis mephitis</i>	Striped Skunk	N	
<i>Muridae (Mice, Rats, Voles &amp; Lemmings)</i>			
<input type="checkbox"/> <i>Clethrionomys gapperi</i>	Southern Red-backed Vole	N	
<input type="checkbox"/> <i>Microtus pennsylvanicus</i>	Meadow Vole	N	
<input type="checkbox"/> <i>Microtus pinetorum</i>	Woodland Vole	N	
<input type="checkbox"/> <i>Mus musculus</i>	House Mouse	I	
<input type="checkbox"/> <i>Ondatra zibethicus</i>	Common Muskrat	N	
<input type="checkbox"/> <i>Peromyscus leucopus</i>	White-footed Mouse	N	
<input type="checkbox"/> <i>Peromyscus maniculatus</i>	Deer Mouse	N	
<input type="checkbox"/> <i>Rattus norvegicus</i>	Norway Rat	I	
<input type="checkbox"/> <i>Synaptomys cooperi</i>	Southern Bog Lemming	N	
<i>Mustelidae (Weasels, Minks, Martens &amp; Otters)</i>			
<input type="checkbox"/> <i>Lutra canadensis</i>	Northern River Otter	N	
<input type="checkbox"/> <i>Martes pennanti</i>	Fisher	N	
<input type="checkbox"/> <i>Mustela erminea</i>	Ermine	N	
<input type="checkbox"/> <i>Mustela frenata</i>	Long-tailed Weasel	N	
<input type="checkbox"/> <i>Mustela vison</i>	American Mink	N	
<i>Phocidae (Earless or Hair Seals)</i>			
<input type="checkbox"/> <i>Phoca vitulina</i>	Harbor Seal	N	
<i>Procyonidae (Raccoons, Coatis &amp; Ringtails)</i>			
<input type="checkbox"/> <i>Procyon lotor</i>	Common Raccoon	N	
<i>Sciuridae (Tree Squirrels &amp; Marmots)</i>			
<input type="checkbox"/> <i>Glaucomys sabrinus</i>	Northern Flying Squirrel	N	
<input type="checkbox"/> <i>Glaucomys volans</i>	Southern Flying Squirrel	N	
<input type="checkbox"/> <i>Marmota monax</i>	Woodchuck	N	
<input type="checkbox"/> <i>Sciurus carolinensis</i>	Eastern Gray Squirrel	N	

<input type="checkbox"/>	<i>Tamias striatus</i>	Eastern Chipmunk	N	<input type="text"/>
<input type="checkbox"/>	<i>Tamiasciurus hudsonicus</i>	Red Squirrel	N	<input type="text"/>

*Soricidae (Shrews)*

<input type="checkbox"/>	<i>Blarina brevicauda</i>	Northern Short-tailed Shrew	N	<input type="text"/>
<input type="checkbox"/>	<i>Sorex cinereus</i>	Masked Shrew	N	<input type="text"/>
<input type="checkbox"/>	<i>Sorex dispar</i>	Rock Shrew	N	<input type="text"/>
<input type="checkbox"/>	<i>Sorex fumeus</i>	Smoky Shrew	N	<input type="text"/>
<input type="checkbox"/>	<i>Sorex hoyi</i>	Pygmy Shrew	N	<input type="text"/>
<input type="checkbox"/>	<i>Sorex palustris</i>	Common Water Shrew	N	<input type="text"/>

*Talpidae (Moles & Shrew-moles)*

<input type="checkbox"/>	<i>Condylura cristata</i>	Star-nosed Mole	N	<input type="text"/>
<input type="checkbox"/>	<i>Parascalops breweri</i>	Hairy-tailed Mole	N	<input type="text"/>
<input type="checkbox"/>	<i>Scalopus aquaticus</i>	Eastern Mole	N	<input type="text"/>

*Ursidae (Bears)*

<input type="checkbox"/>	<i>Ursus americanus</i>	Black Bear	N	<input type="text"/>
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*Vespertilionidae (Vesper Bats)*

<input type="checkbox"/>	<i>Eptesicus fuscus</i>	Big Brown Bat	N	<input type="text"/>
<input type="checkbox"/>	<i>Lasionycteris noctivagans</i>	Silver-haired Bat	N	<input type="text"/>
<input type="checkbox"/>	<i>Lasiurus borealis</i>	Eastern Red Bat	N	<input type="text"/>
<input type="checkbox"/>	<i>Lasiurus cinereus</i>	Hoary Bat	N	<input type="text"/>
<input type="checkbox"/>	<i>Myotis leibii</i>	Eastern Small-footed Bat	N	<input type="text"/>
<input type="checkbox"/>	<i>Myotis lucifugus</i>	Little Brown Bat	N	<input type="text"/>
<input type="checkbox"/>	<i>Myotis septentrionalis</i>	Northern Long-eared Bat	N	<input type="text"/>
<input type="checkbox"/>	<i>Myotis sodalis</i>	Indiana Bat	N	<input type="text"/>
<input type="checkbox"/>	<i>Pipistrellus subflavus</i>	Eastern Pipistrelle	N	<input type="text"/>

*Zapodidae (Jumping Mice)*

<input type="checkbox"/>	<i>Napaeozapus insignis</i>	Woodland Jumping Mouse	N	<input type="text"/>
<input type="checkbox"/>	<i>Zapus hudsonius</i>	Meadow Jumping Mouse	N	<input type="text"/>

**Appendix C. Fire Ecology Resource Management Educational Unit.**

Missing as of 8/4/2014