

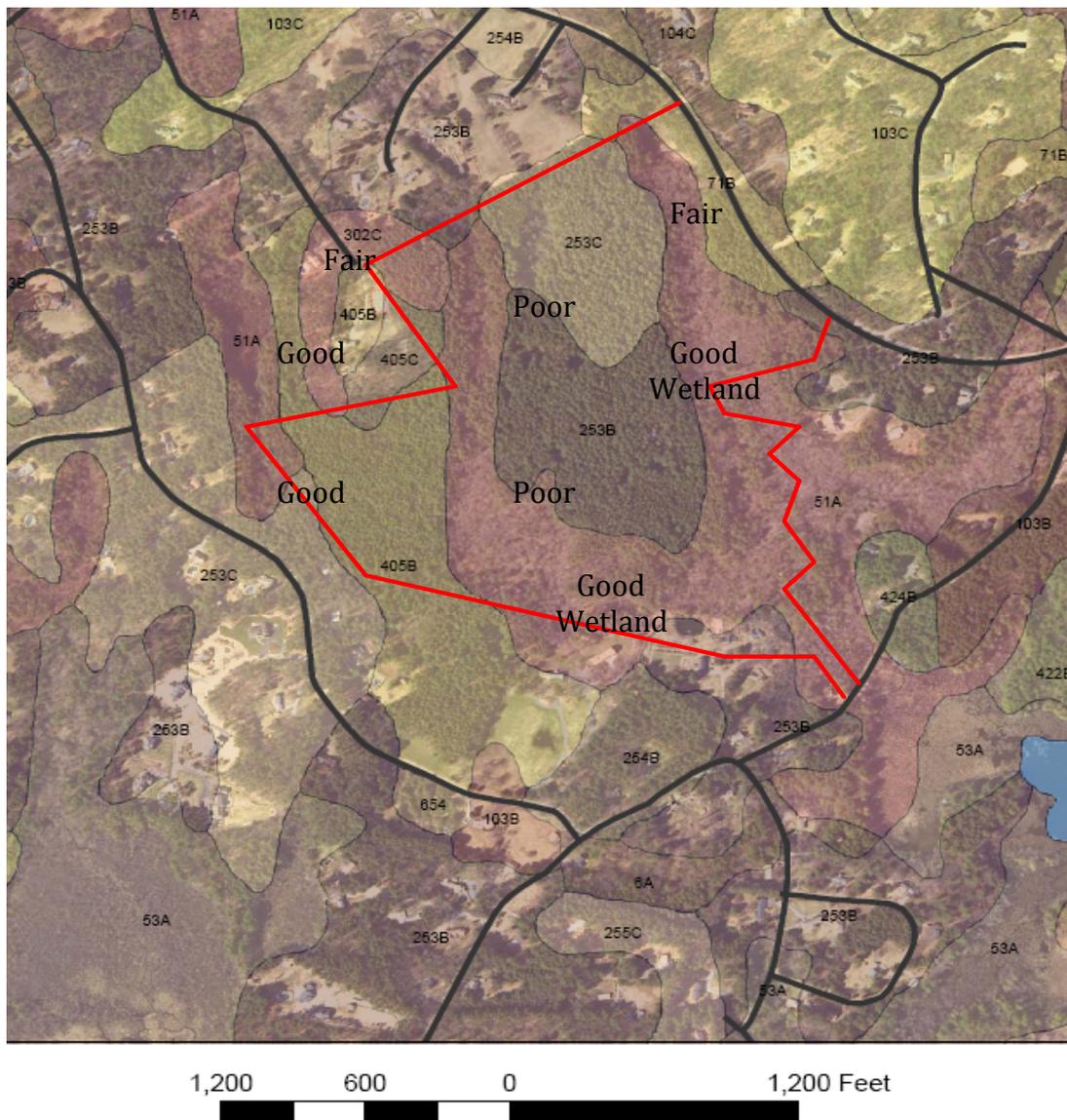
Appendix A. Town Forest Plant List 2009

(Partial List/Work in Progress Prepared by Elizabeth Loutrel, October 2008)

Category	Genus, Species	Common Name	Comments
Trees, canopy			
(mixed-age forest)	<i>Pinus strobus</i>	white pine	dominant upper story
	<i>Pinus resinosa</i>	red pine	
	<i>Quercus alba</i>	white oak	most common deciduous
	<i>Quercus rubra</i>	northern red oak	
	<i>Picea sp.</i>	spruce	
	<i>Acer rubrum</i>	red maple	
	<i>Acer sacharrum</i>	sugar maple	
	<i>Malus sp.</i>	apple	
	<i>Fagus americana</i>	American beech	1 tree on north trail, near 1 st trail S
Shrubs, understory			
	<i>Vaccinium corymbosum</i>	highbush blueberry	
	<i>Vaccinium angustifolium</i>	lowbush blueberry	
	<i>Rhamnus cathartica.</i>	common buckthorn	
	<i>Rhododendron viscosum</i>	swamp azalea	
	<i>Lonicera sp.</i>	honeysuckle	
	<i>Castanea dentata</i>	American chestnut	
	<i>Ulmus americana</i>	American elm	
	<i>Kalmia angustifolia</i>	sheep laurel	
	<i>Prunus pensylvanica</i>	fire cherry	
Ground level			
Fungi	<i>Amanita bisporigera (?)</i>	destroying angel	
Mosses	<i>Polytrichum commune</i>	haircap moss	
	<i>Sphagnum sp.</i>	green peat moss	
Clubmosses	<i>Dendrolycopodium obscurum</i>	Princess pine	
	<i>Diphasiastrum digitatum</i>	Souther running pine	
(Ferns) TBD			
Vascular plants			
	<i>Mitchella repens</i>	partridge berry	
	<i>Symplocarpus foetidus</i>	skunk cabbage	
	<i>Polygala paucifolia</i>	fringed polygala	
	<i>Anemone quinquefolia</i>	wood anemone	
	<i>Maianthemum canadense</i>	Canada mayflower	
	<i>Uvularia sessilifolia</i>	sessile-leaved bellwort	
	<i>Rhus radicans</i>	poison ivy	
	<i>Aralia nudicaulis</i>	wild sarpsarilla	
	<i>Geranium maculatum</i>	wild geranium	
	<i>Impatiens capensis</i>	spotted touch-me-not	
	<i>Trientalis borealis</i>	starflower	
	<i>Cornus canadensis</i>	bunchberry	
	<i>Cypripedium acaule</i>	pink lady's slipper	
	<i>Caltha palustris</i>	marsh marigold	
	<i>Parthenocissus quinquefolia</i>	Virginia creeper	
	<i>Monotropa hypopithys</i>	Indian pipe	

Source: Town Forest Baseline Assessment

Appendix B. Town Forest/Heidke Soils and Wildlife Habitat Potential



Map ID	Map Unit Name	Usages	Drainage	PH	Concerns
51A	Swansea muck, 0 to 1 percent slopes Layers: 0-20" Black muck 0-22" gray fine sand 0-22" grayish brown gravelly sand	Good for wetland wildlife habitat, protected, in woodlands or marshes	Moderately to moderately rapid, poor outlets, high water capacity, high water table, rapid permeability	Strongly acidic to slightly acid	Unstable slopes if excavated, not good for crops
71B	Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony Layers: 0-7" black fine sandy loam	Woodland (moderate for white pine and red oak), fair woodland wildlife habitat, protected	Moderately to moderately rapid, slow to very slow in substratum,	Very strongly acid to strongly acid	Poor permeability and high water restrict septic, windthrow of trees, drainage,

Map ID	Map Unit Name	Usages	Drainage	PH	Concerns
	7-10" brown fine sandy loam with iron 10-65" <u>firm</u> brown gray sandy loam with iron		moderate water capacity, high water table fall to spring		erosion, poor for crops, pasture or homesites due to wetness
253B	Hinckley loamy sand, 3 to 8 percent slope <u>Layers:</u> 0-7" Dark brown loamy sand 7-17 y-brown very <u>gravelly</u> loamy sand 17-65" o-brown stratified <u>extremely gravelly</u> loamy sand	Some crops like sweet corn, woodland (white pine moderate, red oak low – lack of water), not best for pasture, poor potential for woodland wildlife habitat	Rapid to very rapid, very low water capacity, low water table	Strongly acid to mod acid	Poor woodland wildlife habitat, poor filtration for septic, droughtiness, Low content of plant nutrients
253C	Hinkley loamy sand, 8-15 percent slope <u>Layers:</u> 0-7" Dark brown loamy sand 7-17" y-brown very <u>gravelly</u> loamy sand 17-65" o-brown stratified <u>extremely gravelly</u> loamy sand	Woodland (white pine moderate, red oak low due to droughtiness), poor for woodland wildlife habitat	Rapid to very rapid, very low water capacity, low water table	Strongly acid to mod acid	Erosion and droughtiness, poor septic filtration due to rapid draining, erosion, not suited for cultivated crops or pasture, low content of plant nutrients
302C	Montauk fine sandy loam, 8-15 percent slope, extremely stony <u>Layers:</u> 0-7" Dark g-brown fine sandy loam 7-20" y-brown fine sandy loam 20-20" o-brown fine sandy loam 29-65" firm o-brown gravelly loamy sand	Woodland (white pine and red oak high), fair woodland wildlife habitat	Moderate to moderately rapid, mod water capacity	Extremely acid to mod acid	Erosion, incomplete filtration for septic, not for crops or pasture
405B	Charlton fine sandy loam, 3-8 percent slope <u>Layers:</u> 0-5" Dark brown fine sandy loam 5-22" y-brown sandy loam 22-32" g-brown gravelly sandy loam	Well suited to cropland, orchards and pasture, woodland (white pine & red oak moderate), no limits on homesites, good woodland wildlife habitat	Moderate to moderately rapid, mod water capacity	Very strong acid to mod acid	Susceptible to erosion
405C	Charlton fine sandy loam, 8 to 15 percent slope <u>Layers:</u> 0-5" Dark brown fine sandy loam 5-22" y-brown sandy loam 22-32" g-brown gravelly sandy loam	Woodland (white pine & red oak, red spruce, red pine moderate), possible cropland and pasture but highly erodible, possible homesites, good woodland wildlife habitat	Moderate to moderately rapid, mod water capacity	Very strong acid to mod acid	Erosion, slope can effect septic

Appendix C. NRCS Wildlife Habitat Elements, Habitat Types and Ratings

Below is the verbatim description of each of the 6 elements and the 3 habitat types from the 1988 NRCS Soil Survey for Middlesex County, MA.

There are seven habitat elements:

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama grass.

Hardwood trees and woody understory plants produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, and hickory. Examples of fruit-producing shrubs that are suitable for planting on soils rated good are red osier dogwood, highbush blueberry, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wild rice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Dams, levees, or other water-control structures create others. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

There are three types of habitat:

Open land wildlife habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas includes bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Woodland wildlife habitat consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas includes wild turkey, ruffed grouse, woodcock, thrush, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Wetland wildlife habitat consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas is ducks, geese, herons, shore birds, muskrat, mink, and beaver.

There are 4 possible ratings for each element and habitat type:

Good indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected.

Fair indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results.

Poor indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive.

Very poor indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

Appendix D. *BioMap2* Core Habitat Components¹

Components of Core Habitat

Core habitat identifies specific areas necessary to promote the long-term persistence of rare species, other species of conservation concern, exemplary natural communities, and intact ecosystems.

1. **Rare Species** - There are 432 native plant and animal species listed as Endangered, Threatened or Special Concern under the Massachusetts Endangered Species Act (MESA) based on their rarity, population trends, and threats to survival. For *BioMap2*, NHESP staff identified the highest quality habitat sites for each non-marine species based on size, condition, and landscape context.
2. **Other Species of Conservation Concern** - In addition to species on the MESA List described previously, the State Wildlife Action Plan (SWAP) identifies 257 wildlife species and 22 natural habitats most in need of conservation within the Commonwealth. *BioMap2* includes species-specific habitat areas for 45 of these species and habitat for 17 additional species which was mapped with other coarse-filter and fine-filter approaches.
3. **Priority Natural Communities** - Natural communities are assemblages of plant and animal species that share a common environment and occur together repeatedly on the landscape. *BioMap2* gives conservation priority to natural communities with limited distribution and to the best examples of more common types.
4. **Vernal Pools** - Vernal pools are small, seasonal wetlands that provide important wildlife habitat, especially for amphibians and invertebrate animals that use them to breed. *BioMap2* identifies the top 5 percent most interconnected clusters of Potential Vernal Pools in the state.
5. **Forest Cores** - In *BioMap2*, Core Habitat includes the best examples of large, intact forests that are least impacted by roads and development, providing critical habitat for numerous woodland species. For example, the interior forest habitat defined by Forest Cores supports many bird species sensitive to the impacts of roads and development, such as the Black-throated Green Warbler, and helps maintain ecological processes found only in unfragmented forest patches.
6. **Wetland Cores** - *BioMap2* used an assessment of Ecological Integrity to identify the least disturbed wetlands in the state within undeveloped landscapes— those with intact buffers and little fragmentation or other stressors associated with development. These wetlands are most likely to support critical wetland functions (i.e., natural hydrologic conditions, diverse plant and animal habitats, etc.) and are most likely to maintain these functions into the future.
7. **Aquatic Cores** - To delineate integrated and functional ecosystems for fish species and other aquatic Species of Conservation Concern, beyond the species and exemplary habitats described above, *BioMap2* identifies intact river corridors within which important physical and ecological processes of the river or stream occur. –

¹ *BioMap2 Carlisle Report*. 2012. pg 4-6

Appendix E. Potential Wildlife for the TownForest/Heidke Land

Potential Amphibians and Reptiles for the Town Forest/Heidke Land

Species Special Needs	Swamp (Red maple)	Oak-Pine (Pine-Oak- Maple)	Oak-pine (Eastern white pine)	Shallow marsh	Shrub swamp	Stream	Vernal pool
Amphibians							
Blue-spotted Salamander <i>Ambystoma laterale</i> Vernal pools or semipermanent water adjacent to upland habitat for breeding	X			X	X		X
Spotted Salamander <i>Ambystoma maculatum</i> Mesic woods, vernal pools or semipermanent water for breeding	X			X			X
Northern Redback Salamander <i>Plethodon cinereus</i> Logs, stumps, rocks, etc.	X	X	X				
Eastern American Toad <i>Bufo a. americanus</i> Shallow, still water for breeding	X	X	X	X	X	X	
Northern Spring Peeper <i>Psuedacris c. crucifer</i> Pools for breeding adjacent to forested or shrub habitat	X	X	X	X	X		
Gray Treefrog <i>Hyla versicolor</i> Seeps or shallow water adjacent to upland forests for breeding; hibernates under leaves or logs	X	X		X	X		
Green Frog <i>Rana clamitans melanota</i> Margins of riverine or lacustrine habitats for breeding	X			X	X		X
Wood Frog <i>Rana sylvatica</i> Vernal pools in forest habitat	X	X	X	X			X
Pickerel Frog <i>Rana palutris</i> Shallow, clear water of bogs, woodland streams, and lake margins.				X		X	
Reptiles							
Painted Turtle <i>Chrysemys picta</i> Wetlands with basking site, areas of open water				X	X	X	
Blandings Turtle <i>Emydoidea blandingii</i> Wetland complex with shallow water ≤ .5m adjacent upland fields or forest for nesting		X	X	X			
Northern Brown Snake <i>Storeria d. dekayi</i>	X	X	X	X	X		
Northern Redbelly Snake <i>Storeria o. occipitamaculata</i> Woodland debris – bark and rotting wood	X	X	X				

Species Special Needs	Swamp (Red maple)	Oak-Pine (Pine-Oak- Maple)	Oak-pine (Eastern white pine)	Shallow marsh	Shrub swamp	Stream	Vernal pool
Common Garter Snake <i>Thamnophis sirtalis</i>	X	X	X	X	X	X	
Ribbon Snake <i>Thamnophis suaritus</i> Permanent shallow water with nearby cover	X	X	X			X	
Northern Ringneck <i>Diadophis punctatus edwardsii</i> Mesic areas with abundant cover	X	X	X				

Potential Mammals for the Town Forest/Heidke Land

Species Special Needs	Swamp (Red maple)	Oak-Pine (Pine-Oak- Maple)	Oak-pine (Eastern white pine)	Shallow marsh	Shrub swamp	Stream	Vernal pool
Virginia Opossum <i>Didelphis virginiana</i> Hollow log or tree cavity	X	X	X		X		
Masked Shrew <i>Sorex cinereus</i> Damp woodlands, ground cover	X	X	X		X		
Water Shrew <i>Sorex palustris</i> Herbaceous cover, wetlands	X		X		X		
Hairy-tailed Mole <i>Parascalops breweri</i> Loose, moist well-drained soil	X	X	X				
Hoary Bat <i>Lasiurus cinereus</i> Roosts in coniferous and deciduous foilage	X	X	X		X	X	
Eastern Chipmunk <i>Tamias striates</i> Tree or shrub cover; elevated perches, decaying stumps/logs, stone walls	X	X	X				
Gray Squirrel <i>Sciurus carolinensis</i> Mast-producing trees;tall trees for dens and leaf nests	X					X	
Red Squirrel <i>Tamiasciurus hudsonicus</i> Woodlands with mature trees; conifers preferred	X	X	X				
Southern Flying Squirrel <i>Glaucomys volans</i> Mature woodland with cavity trees; favors cavity entrances 1.6-2"			X				
Northern Flying Squirrel <i>Glaucomys sabrinus</i> Mature trees, cavities for winter, arboreal lichens			X				

Species Special Needs	Swamp (Red maple)	Oak-Pine (Pine-Oak- Maple)	Oak-pine (Eastern white pine)	Shallow marsh	Shrub swamp	Stream	Vernal pool
Deer Mouse <i>Peromyscus maniculatus</i> Down logs and rotting stumps	X	X	X				
White-footed Mouse <i>Peromyscus leucopus</i> Down logs, rotting stumps, cavities	X	X	X		X		
Southern Red-backed Vole <i>Clethrionomys gapperi</i> Springs, brooks, seeps, bogs; debris or slash cover	X	X	X		X		
Porcupine <i>Erizithon dorsatum</i> Rock ledges or den tress		X	X				
Coyote <i>Canis latrans</i> Well-drained secluded den sites	X	X	X	X	X		
Raccoon <i>Procyon lotor</i> Hollow trees, dens usually >10' above ground	X	X	X				
White-Tailed Deer <i>Odocoileus virginianus</i> Dense cover for winter shelter, adequate browse	X	X	X		X		

The list of birds below was greatly enhanced by the two breeding bird surveys done by Alan Ankers, Tom Brownrigg and D'Ann Brownrigg at the Town Forest in May and June of 2014. These surveys verified many of the species on the potential bird list derived from the reference book by DeGraaf that was used for the amphibians, reptile and mammal lists. There were 6 species not on the breeding bird surveys that were added from the DeGraaf book, which were potential matches for the Town Forest/Heidke habitat. A third list that was part of the 2009 Town Forest/Heidke Baseline Assessment covering the period from 2000-2008 was used to suggest other species that might inhabit the Town Forest/Heidke, taking into consideration that the habitat may have changed since that survey was done and which of those species might use the habitat for breeding. There are 34 bird species from the recent breeding bird surveys and 6 potential bird species giving a total of 40.

Town Forest/Heidke Breeding Bird Surveys and Potential Other Bird Species

Species	5-31-14	6-21-14	N. E Wildlife [DeGraaf]
1. Canada Goose	X		
2. Red-shouldered Hawk			X
3. Red-tailed Hawk		X	
4. Wild Turkey			X
5. Barred Owl			X
6. Mourning Dove		X	
7. Chimney Swift	X		
8. Red-bellied Woodpecker	X	X	
9. Hairy Woodpecker	X		
10. Pileated Woodpecker			X
11. Northern Flicker	X		
12. Eastern Wood-pewee	X		
13. Least Flycatcher (presumed passage migrant)	X		

Species	5-31-14	6-21-14	N. E Wildlife [DeGraaf]
14. Eastern Phoebe	X	X	
15. Great Crested Flycatcher	X	X	
16. Blue Jay	X*	X*	
17. American Crow	X		
18. Black-capped Chickadee	X*	X*	
19. Tufted Titmouse	X*	X*	
20. Red-breasted Nuthatch	X	X	
21. White-breasted Nuthatch	X	X*	
22. Brown Creeper	X*	X*	
23. House Wren	X	X	
24. Winter Wren	X*	X*	
25. Blue-gray Gnatcatcher			X
26. Eastern Bluebird	X		
27. Hermit Thrush			X
28. American Robin	X*	X*	
29. Gray Catbird	X	X*	
30. Cedar Waxwing	X		
31. Pine Warbler	X	X*	
32. Ovenbird	X*	X*	
33. Common Yellowthroat	X	X*	
34. Scarlet Tanager	X**		
35. Chipping Sparrow	X	X	
36. Song Sparrow	X	X	
37. Northern Cardinal		X	
38. Indigo Bunting	X		
39. Common Grackle	X	X**	
40. American Goldfinch		X	

* Recorded in area of proposed trail and elsewhere

** Recorded ONLY in area of proposed trail

Appendix F. Potential Wildlife Species by Home Range Area (acres)²

Species	0-10 acres	11-50 acres	>50 acres
<i>Amphibians</i>			
Blue-spotted Salamander	X		
Spotted Salamander		X	
Northern Redback Salamander	X		
Eastern American Toad	X		
Northern Spring Peeper	X		
Gray Treefrog	X		
Green Frog	X		
Wood Frog	X		
Pickerel Frog	X		
<i>Reptiles</i>			
Painted Turtle	X		
Blandings Turtle	X		
Northern Redbelly Snake	X		
Ribbon Snake	X		
Northern Ringneck	X		
<i>Mammals</i>			
Virginia Opossum		X	
Masked Shrew	X		
Water Shrew	X		
Hairy-tailed Mole	X		
Hoary Bat	X		
Eastern Chipmunk	X		
Gray Squirrel	X		
Red Squirrel	X		
Southern Flying Squirrel	X		
Northern Flying Squirrel	X		
Deer Mouse	X		
White-footed Mouse	X		
Southern Red-backed Vole	X		
Porcupine		X	
Coyote			X
Raccoon			X
White-Tailed Deer			X
<i>Birds</i>			
Canada Goose		X	
Red Shouldered Hawk			X
Red Tailed Hawk			X
Wild Turkey			X
Barred Owl			X
Mourning Dove	X		

² DeGraaf, Yamasaki, Leak, Lester. 2006. *Technical Guide to Forest Wildlife Habitat Management in New England*. Pp 24-27

Species	0-10 acres	11-50 acres	>50 acres
Chimney Swift			X
Red-bellied Woodpecker	X		
Hairy Woodpecker	X		
Pileated Woodpecker			
Northern Flicker	X		
Eastern Wood-pewee		X	
Least Flycatcher (presumed passage migrant)	X		
Eastern Phoebe	X		
Great Crested Flycatcher	X		
Blue Jay		X	
American Crow			X
Black-capped Chickadee		X	
Tufted Titmouse		X	
Red-breasted Nuthatch		X	
White-breasted Nuthatch		X	
Brown Creeper		X	
House Wren	X		
Winter Wren	X		
Blue-gray Gnatcatcher	X		
Eastern Bluebird		X	
Hermit Thrush	X		
American Robin	X		
Gray Catbird	X		
Cedar Waxwing		X	
Pine Warbler	X		
Ovenbird	X		
Common Yellowthroat	X		
Scarlet Tanager	X		
Chipping Sparrow	X		
Song Sparrow	X		
Northern Cardinal		X	
Indigo Bunting	X		
Common Grackle	X		
American Goldfinch	X		