

The unique, wide-open feel of the landscape at the Macricostas Preserve is a major factor in its value as conservation land and we recommend that Steep Rock maintain this characteristic in the long term.

6.6: Monitoring

The primary tool for management of the Macricostas Preserve is periodic biophysical monitoring of several key areas. By developing an extensive database of vegetation cover, species richness, forest health, etc., changes over time can be tracked and a valuable historical record will be created for use in the future by land managers, researchers, students, and other interested parties. Furthermore, periodic monitoring will enable Steep Rock to pinpoint and address any management issues, such as invasion by exotic species, before they spiral out of control. Specific monitoring management suggestions are as follows:

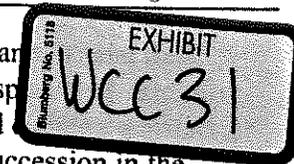
6.6.1: BioBlitz

Steep Rock should consider assembling a group of naturalists with specializations in different species taxa, such as birds, small mammals, large mammals, herbaceous plants, wetland plants, shrubs, fungi, insects, spiders, amphibians, etc., to investigate the Macricostas Preserve and categorize every species found. A periodic BioBlitz, every five years in spring, summer, and fall, would provide a comprehensive listing of the biota within the Preserve. Rare species, specifically plants and amphibians, would be located and habitat protection measures then identified.

6.6.2: Herbarium

Betsy Corrigan, local field naturalist, is in the process of constructing a herbarium for the Macricostas Preserve (Fall 2002). Periodic BioBlitzing as defined above would enable

Steep Rock to maintain an herbarium, adding new species collected on the Preserve and record of vegetational succession in the Preserve.



6.6.3: Vernal Pool Inventory

Vernal pools are protected as watercourses under Connecticut State Law (183 C. 532, 539 Sec. 22a-38). A trained ecologist should inventory and map all vernal pools within the Macricostas Preserve and register his/her findings with the State. Several methods exist for inventorying and certifying vernal pools, as delineated by the Massachusetts Natural Heritage and Endangered Species Program (2000):

Obligate Species Method: Evidence of a confined basin depression with no permanently flowing outlet and evidence of either breeding obligate amphibians or adult obligate invertebrate

Facultative Species Method: Evidence of a confined basin depression with no permanently flowing outlet and evidence that there is no established, reproducing fish population, and photographs of two or more of a selected list of amphibians, reptiles, and invertebrates (Table 3).

Dry Pool Method: Evidence of a confined basin depression containing no standing water (dry pool) and one of the following:

- Cases of caddisfly larvae (*Trichoptera*)

- Adults, juveniles, or shells of either freshwater clams (*Pisidiidae*) amphibious, air-breathing snails (*Basommatophora*)

- Shed skins (exuvia) of dragonfly or damselfly larvae on vegetation along the edge of the pool

| AMPHIBIANS |
|--|
| Breeding Spring peeper (<i>Pseudacris crucifer</i>) |
| Breeding Gray treefrog (<i>Hyla versicolor</i>) |
| Breeding American toad (<i>Bufo americanus</i>) |
| Breeding Fowler's toad (<i>Bufo woodhousii</i>) |
| Breeding Green frog (<i>Rana clamitans melanota</i>) |
| Breeding Pickerel frog (<i>Rana palustris</i>) |
| Breeding Leopard frog (<i>Rana pipiens</i>) |
| Breeding Four-toed salamander (<i>Hemidactylium scutatum</i>) |
| Adult or Breeding Red-spotted Newt (<i>Notophthalmus v. viridescens</i>) |
| REPTILES |
| Spotted turtle (<i>Clemmys guttata</i>) |
| Blanding's turtle (<i>Emydoidea blandingii</i>) |
| Wood turtle (<i>Clemmys insculpta</i>) |
| Painted turtle (<i>Chrysemys p. pictata</i>) |
| Snapping turtle (<i>Chelydra serpentina</i>) |
| INVERTEBRATES |
| Predaceous diving beetle larvae (<i>Dytiscidae</i>) |
| Water scorpion (<i>Nepidae</i>) |
| Dragonfly larvae (<i>Odonata: Anisoptera</i>) |
| Damselfly larvae (<i>Odonata: Zygoptera</i>) |
| Dobsonfly larvae (<i>Corydalidae</i>) |
| Whirligig beetle larvae (<i>Gyrinidae</i>) |
| Caddisfly larvae (<i>Trichoptera</i>) |
| Leeches (<i>Hirundinea</i>) |
| Freshwater (fingernail) clams (<i>Pisidiidae</i>) |
| Amphibious, air-breathing snails (<i>Basommatophora</i>) |

Table 4: Species appropriate for evaluation of vernal pools by the Facultative Species Method.

Once pools have been identified, periodic monitoring can determine how the pools may be expanding or decreasing in area over time. Regular species inventories can also determine the presence of endangered or threatened species, and subsequent habitat conservation plans should be adopted given their presence. Attached as Appendix H are sample vernal

pool inventory sheets used by the Massachusetts Natural and Endangered Heritage Program.

6.6.4: Forest Health Monitoring

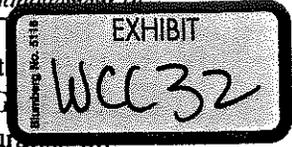
The greatest threats to ecosystems within the Macricostas Preserve are invasive plants and pathogens. By instructing the public users through trail signs and brochures available at the trailhead to report any suspected invasive plants or pathogens, such as the woolly adelgid, to Steep Rock, management steps as outlined in Section 6.9 can be appropriately evaluated and engaged to control the problem. Trail corridors and parking areas are especially vulnerable to invasion by exotic plants as cars, humans, and pets can all act as dispersal agents. Periodic inventory of the wetland areas should also help to identify any new invasions carried by Bee Brook through its course or brought by birds and small mammals.

6.7: Areas of Ecological Significance

Through the inventory of the Macricostas Preserve, several areas were identified as unique and should be regularly monitored. Three areas warrant specific mention: the talus slopes, the black gum ridgetop hollow, and the calcareous swamp areas.

6.7.1: Talus Slopes

The talus slopes will be an ideal location to survey local wildlife. As we have stated earlier, there are many species dependent upon caves, rock outcrops, and other rock formations. This should provide significant opportunity for scientific study. Care should also be taken in these areas regarding passive recreation. The large boulders and talus could cause injury to hikers.



6.7.2: Black Gum Ridge Top Hollow

An old-growth Black Gum, or Tupelo (*Nyssa sylvatica*) stand was found in a large vernal pool area southwest of the Pinnacle. Regular diameter at breast height (dbh) and height measurements should be taken to monitor the growth of these trees. This site may be recommended to the Connecticut Department of Environmental Protection for inclusion in Connecticut's Natural Diversity Data Base, a subset of the Natural Heritage Program. We would recommend that this area remain off the general trail system since it is part of a vernal pool system. Given its swampy character, we feel that it will mainly be of interest to specialists and they can be informed on a need to know basis.

6.7.3: Calcareous Wetlands

A survey of rare plants should be conducted in the calcareous wetlands. There is a good chance that state and federally listed endangered or threatened species could show up in these areas, and this may significantly affect management decisions. Water quality should also be monitored, and details about pH content of the soils and water should be recorded.

6.8: Educational and Research Opportunities

6.8.1: Education and Research

Because of the unique ecosystems occurring within the Macricostas Preserve, an interpretative brochure associated with the loop trail would help the public realize the ecological significance of the Preserve. Interesting points, such as the red maple swamp, forest health problems and invasive species, wildlife habitat, calcareous wetlands, and past land use could be identified and explained. By encouraging local schools to bring students to the

Preserve, an early conservation ethic could be instilled in the next generation. Guided walks, perhaps led by a local naturalist, are also an easy means of achieving the goal of conservation education.

Furthermore, other unique characteristics withheld from the public trail system, such as the Black Gum Ridgetop Hollow, could be open for researchers from local universities to conduct research projects.

6.8.2: Archaeological Studies

Another interesting aspect of the Macricostas Preserve is historical use by Native Americans. A survey in 1978 by a field crew from the then American Indian Archaeological Institute (AIAI) and students from the Gunnery School, the local private college preparatory high school, found prehistoric tools and tool fragments predominantly along the knoll bordered by Bee Brook in the West, Meeker Swamp in the north, and Route 202 to the south. The results of this survey determined that this area had discrete concentrations of artifacts dating between 7000 and 2500 years ago (Handsman 1987).

The potential developers of Meeker Swamp commissioned the AIAI in 1987 to prepare a report determining the impact on the archaeological resources contained within the area to be altered by construction. The area surveyed included the property bounded by Route 202, Christian Street, and Meeker Swamp. The survey results determined that hunter-gatherers have used the areas surrounding the wetlands for several thousand years, probably wintering in the high grounds and using the wetlands to hunt grouse and deer (Swigart, personal communication with Lydia Dixon). Ned Swigart, former director of the AIAI, noted that the research findings were not particularly productive in the 1987 survey. However, the

potential for future discoveries here is high given the historical use of wetlands by Native Americans as a focal point for settlement and land use (Handsman 1987).

Given the historical concentration of Native Americans in this region and the similarity of the Meeker Swamp area to other places in Northwest Connecticut that have archaeological significance, it is likely that a further study could unearth interesting archaeological findings (Swigart, personal communication with Lydia Dixon, December 2002). Swigart also noted that the Institute for American Indian Studies (formerly AIAI) in Washington should be very interested in pursuing further research at this site if the Steep Rock Association expressed a desire for exploration, contingent upon the reestablishment of the research program at the IAIS (which should be forthcoming).

6.9: Forest Health

A primary goal in managing the Macricostas Preserve is the conservation of native biodiversity. The insects and pathogens and invasive species detailed in section 4.2 are revisited with suggestions for managing their spread and mitigating damage to local ecosystems sustained by these pests. Addressing forest health is a primary issue in preserving the integrity of Northeastern forests. Restoring areas degraded by past use and subsequently invaded by exotic species and taking steps to alleviate damage caused to tree species by deadly pests should be a top priority in managing the Macricostas Preserve.

6.9.1: Insects and Pathogens

Hemlock Woolly Adelgid: Though no infested hemlock trees were observed in the Macricostas Preserve in our Biophysical

Inventory, monitoring and public education of Preserve users will ensure that once the adelgid does arrive at the Preserve it may be caught early in the infestation. Given Steep Rock's previous experience with Mark McClure, entomologist at the Connecticut Agricultural Experiment Station, it would be beneficial to report any infestation to McClure and determine its scale (Branson 2002). Depending on the accessibility of the infested trees and the financial resources available, the biological control method of releasing *Pseudoscymnus tsugae*, a natural predator of the adelgid, may be employed to reduce the potential for a large-scale hemlock death. Because of Steep Rock's positive experience in the Steep Rock Reservation with *Pseudoscymnus tsugae*, in which the adelgid infestation seems to be declining and hemlock growth rates increasing, other management options such as salvage logging and planting are less favorably advised (Branson 2002).

Hemlock Scale: Currently, the elongate hemlock scale (*Fiorinia externa*) is the primary threat to hemlock stands in the Macricostas Preserve. Treatment options are limited, as there is no practical chemical option for attacking the scale. Aerial spraying is ineffective due to the nature of the scale, which attacks the underside of hemlock needles. Spraying from below is also ineffective due to the near impossibility of complete coverage spraying; incomplete spraying results in mortality to natural predators of the scale (Roy 1992). Salvage logging is impractical, as access is difficult and would most likely not be cost-efficient. There is no practical solution for control of hemlock scale.

Beech Bark Disease: Occasionally, in areas heavily infested with beech bark disease a few individuals remain unscathed, indicating that some beeches may be genetically resistant to the disease. However, because beech repro-



**A Management Plan for the Steep Rock Association's
Macricostas Preserve**

**Washington, Connecticut
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Executive Summary

In May of 2002, Susan Branson, the Executive Director of the Steep Rock Association, contacted Professor Mark Ashton of the Yale School of Forestry and Environmental Studies and requested a proposal for an ecological and management evaluation of their newly assembled Macricostas Preserve in Washington, Connecticut (Appendix A). Professor Ashton passed this request on to us in the fall of 2002 to complete as our major project in the *Management Plans for Protected Areas* class offered in the fall semester. We were required to respond to the request, create an ecological evaluation and management plan, and present it to the Steep Rock Trustees in early December.

We undertook a biophysical inventory during the month of October in which we surveyed those elements of the local ecology outlined in the request. Over the month of November we interviewed local stakeholders to help define the social context in which management decisions would be made. Finally, we prepared a detailed list of management objectives and scenarios which the trustees could adopt. As with any general plan, many of the requests involved further in-depth study, and although this plan will not answer all the questions at hand we hope it will provide an impetus for more directed research and work in the future.

Management recommendations were outlined according to this ecological survey. The major recommendations are summarized below:

- Maintain open grasslands through controlled burning.
- Continue leasing land for agricultural use.
- Incorporate existing trails and create new trails to establish a network for passive recreation.
- Investigate the feasibility of allowing limited deer hunting.
- Initiate in-depth natural resource surveys.
- Periodically monitor wetlands, forest health, and wildlife populations.

Chapter 1: Background

1.1 Setting: The Macricostas Preserve

The Macricostas Preserve is a 368-acre parcel of mixed woodland, wetland, and meadow located in western Connecticut (see Fig. 1). This acreage lies just south of the border separating the towns of Washington (pop. 3,596) and Warren (pop. 1,254). The southern edge of the property is demarcated by Route 202 and Christian Street, and is adjacent to the only groups of private residential lots bordering the site. The northern edge of the property lies along a ridge that reaches its highest point at the "Pinnacle", a rock outcrop with sweeping views of the local terrain and Lake Waramaug directly to the northwest. This side of the property is dense forestland, with a wide mix of species and soil types. Bee Brook, a minor tributary to the Shepaug River, transects the lowland area. Meeker Swamp, the headwaters of Bee Brook, dominates the lowlands on the

eastern edge of the property. Much of the area surrounding Bee Brook is wetland and has been traditionally used as pasture and farmland.

The topography of the site is highly variable ranging from 200 to 1200 feet above sea level, as demonstrated in Figure Two. The elevation gradient runs from the highest lands in the northwest to the lowlands near Meeker Swamp and Bee Brook. Figures Three and Four demonstrate three-dimensional views of the property and the dramatic relief of the area. The highest point on the property is the Pinnacle, a well-known rock outcrop and hikers' destination. From this viewpoint, hikers are graced with a 360° view of the surrounding countryside highlighted by excellent views of Lake Waramaug. Currently the Pinnacle is protected by a public access easement and a conservation easement. It is also serviced by two main trails originating from properties adjacent to the lake.

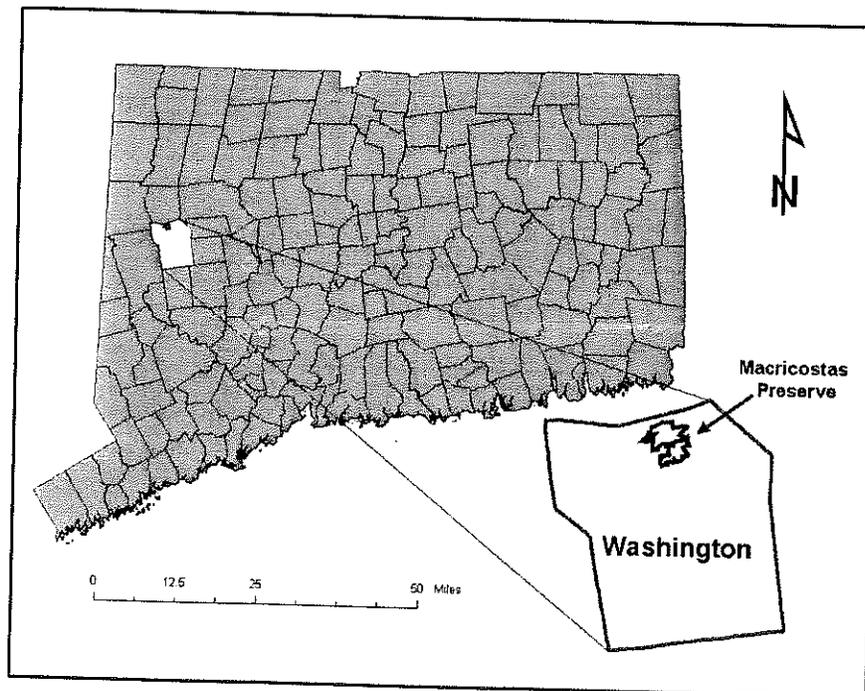


Figure 1: Location of the Macricostas Preserve in Western Connecticut.

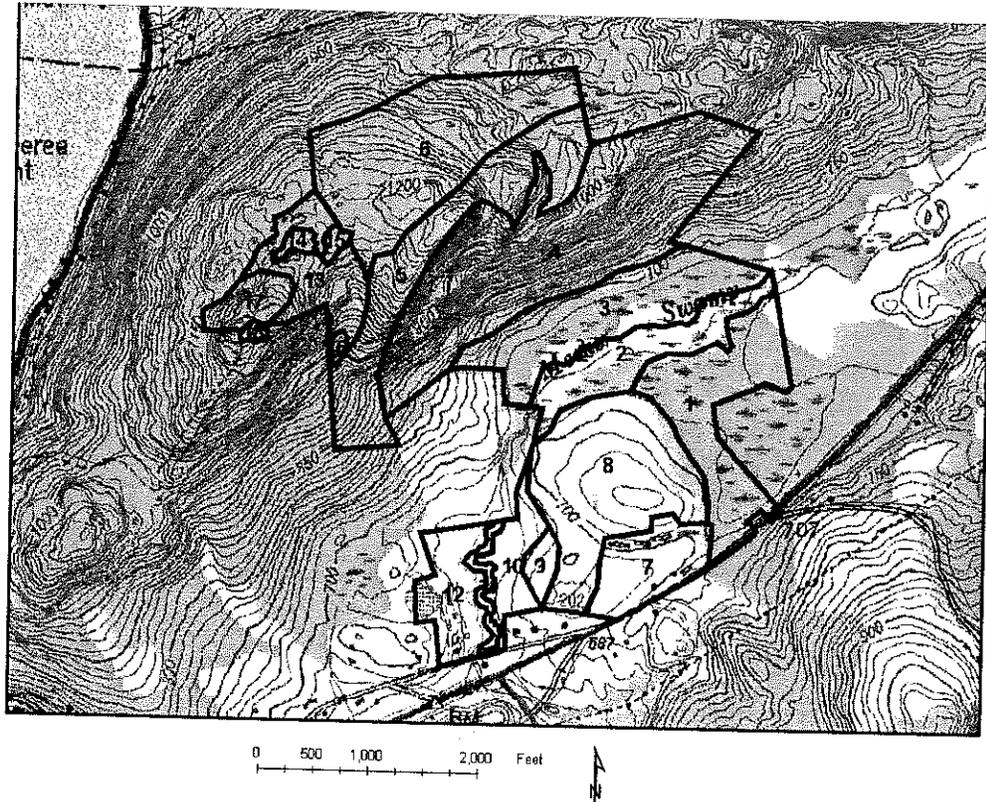


Figure 2: Topographic view of the property.



Figure 3: NE view of the property.



Figure 4: NW view of the property.

1.2: Goals and Objectives

This plan was written to provide the Steep Rock Association with a comprehensive management strategy for the Macricostas Preserve. The objectives of the Steep Rock Associates in managing this parcel were twofold:

- To determine the natural potential of the site and delineate conservation measures to ensure ecosystem viability
- To encourage community awareness and use of the preserve

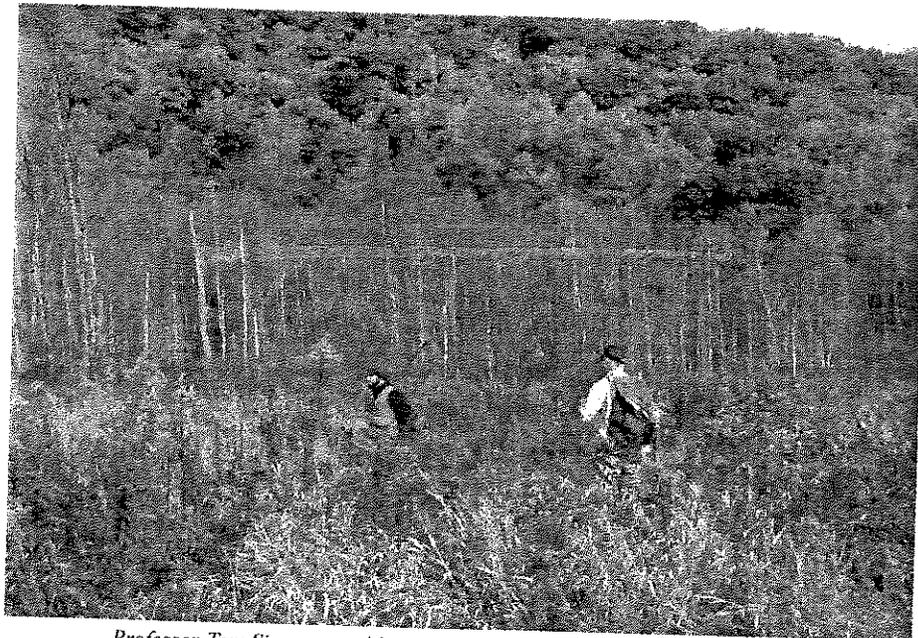
We directed the focus of our management plan to achieve these goals through several methods.

To determine natural potential of the site, we undertook a thorough biophysical inventory of the Macricostas Preserve, including determinations of underlying physical properties, forest stands and forest health, historical and present land use, wildlife habitat, and areas of ecological significance. We then recommended management strategies focusing on conser-

vation and research potential through regular monitoring of specific areas within the preserve, as well as techniques for preservation and restoration of the abandoned open fields within the preserve.

To encourage community awareness, we focused on creating strategies that encourage passive recreation on the property, primarily through the establishment of hiking trails or conversion of abandoned roads to trails within the preserve. We emphasized education as a primary component of encouraging community awareness of the preserve and its' unique ecological components, including calcareous wetlands and talus slope wildlife habitats.

Given the local interest in preserving farmland in the area, we also addressed continued farming on the preserve as a means of preserving open space, enhancing valuable edge habitat, and easing social pressures exerted on the Steep Rock Association by the community.



Professor Tom Siccamo and Ian make their way through the marsh.

diversity of wildlife foods available for other species, specifically through a loss of seeds, nuts, berries, and insects associated with the heavily browsed tree species (Tilghman 1989).

Natural disturbances can also impact forest succession and forest health. Hurricanes, fire, and windstorms can create small to large gaps which halt the successional pathway of a particular stand and revert it to early seral habitat. We found two areas influenced by natural disturbance that are particularly notable. In stand 6, we found large ash snags split off at their trunks roughly where they were exposed to winds coming over the ridge top. We also noted an area with small gaps in the canopy which are now dominated by high-bush blueberry and *Rubus* sp. These erratic disturbances are a natural part of ecosystem function and actually can create habitat diversity by altering the composition of a stand and attracting wildlife. (Beattie et al 1993).

4.7: Areas of Ecological Interest

There are several ecological niches that should be mentioned separately within this management plan. These areas are unique on the property and represent rare or valuable ecosystems within Connecticut. Each of these areas may deserve a separate ecological study by trained professionals. Many of these areas can be expected to add significant plant and animal biodiversity to the Macricostas Preserve. Each of these areas should be given special consideration when management decisions are being made. In most cases these areas should be off limits for passive recreation.

4.7.1: Talus Slopes

Talus slopes are deposits of large angular fragments of weathered rock at the base of cliffs and steep slopes (Press and Siever 1993).



A natural disturbance, probably a tornado or hurricane event, knocked back the successional pathway in this particular stand to early seral habitat dominated by high bush blueberry.

There are several talus slopes on the Macricostas Preserve, primarily in forest stand 4. This area is easily recognizable by the large cliffs of gneiss and schist that drop off from the neighboring ridge top. Most of the soils in these areas are very thin to bedrock. As a result the drainage on these areas is very rapid. Xeric conditions abound on the upper reaches of these slopes and trees do not reach their maximum heights. In toe slopes and at the foot of the steep drops the sites become more mesic with a resulting change in overall tree health, height, and species composition.

Unique ground-story plant communities can be found in these areas. Many of the plants are lichens or other species that can survive on the harsh xeric microclimate of the boulders themselves. Most of the plant activity occurs within the cracks of the boulders, since this is the most highly weathered area, and can contain a remnant water supply after storm events. The lichens and mosses provide the beginnings of an organic mat that can provide an organic layer that becomes an excellent seedbed for the vascular plants. The more important pioneer species in this microclimate include xerophytic plants.

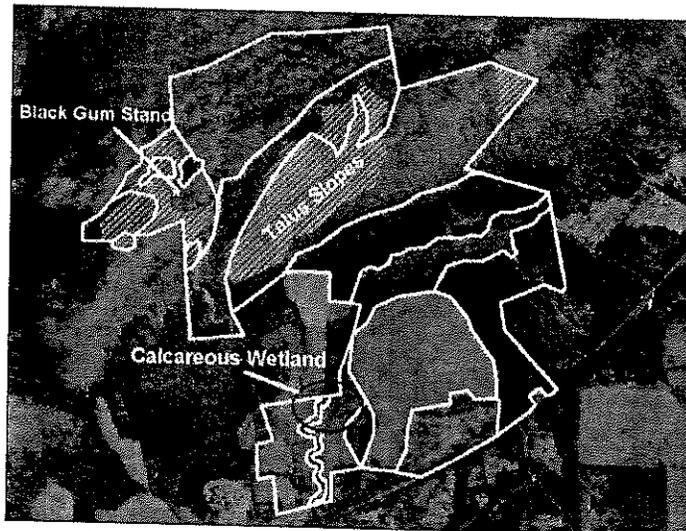


Figure 40: Map locating areas of ecological significance.

A second factor contributing to the unique character of the talus slope systems is its provision for wildlife habitat. The cliffs and boulders that dominate the steep slopes of the Macricostas Preserve contain abundant dens for rock-sheltering mammals, rocks for cold-blooded animals to sun on, and excellent perches for predators.

These systems can be characterized by their dynamism. It must be remembered that they are driven by disturbance on a major and minor scale. Locally, there are many trees that are blown over and create microhabitats. In major wind and water events such as hurricanes, and ice storms, these high slope and rocky areas are the first to be drastically altered.

4.7.2: Ridge Top Black Gum Hollow

Black gum (*Nyssa sylvatica*) is a well-known and relatively common tree in flood plains and wetlands across Connecticut. It is very tolerant of hydric soils, and does not generally compete well with other northern hardwoods and conifers in upland areas. As would be expected, the Macricostas Preserve has many exam-

ples of this tree species in the lowlands, and wet areas across the property. However, we have also found many examples of this tree in relatively unlikely habitats. We have found several small stunted specimens at the very highest point of the property, the Pinnacle. While the thin soils may create perched water tables that could favor the tolerant Black Gum trees, the larger question remained as to where the seed source for these specimens at the top of the ridge was.

The answer to this question was found nearby – a mere several hundred yards from the Pinnacle – in a small vernal pool dominated by winterberry holly (*Ilex verticillata*) and Black Gum trees. Within this one-acre site, the canopy is almost exclusively Black Gum, some individuals of which approach 21-22” in diameter. The winterberry holly survives on top of small mounds that extend up from the surface of the pool.

We cored a few of the largest trees within this area to determine growth pattern and approximate age. The cores showed that the two trees were each between 180 and 200 years of age – certainly some of the oldest trees on the property. Interestingly, they are not quite near the age of the oldest Black Gum trees in New England. There are examples of 500-600 years old specimens in various adjoining states (US Forest Service 2002). However, it should be readily noted that even at 200 years, this stand would be considered “old growth” by most ecologists within the area (Leverett 2002).

“Old growth” sites east of the Mississippi River are relatively rare, since there is almost no land that has not been heavily harvested within this part of the country. Often the largest areas of untouched timber are found only in areas that are not easily accessible or



We cored *Nyssa* trees to determine the age of the stand (Figure 39).

have little economic value. Ridge tops and steep slopes are the site of some of the oldest timber within New England (Leverett 2002). In fact the largest and oldest Black Gum trees in Vermont, Massachusetts, and New Hampshire are on the highest peaks. It would appear that this stand of trees on one of the highest points within Connecticut follows this pattern.

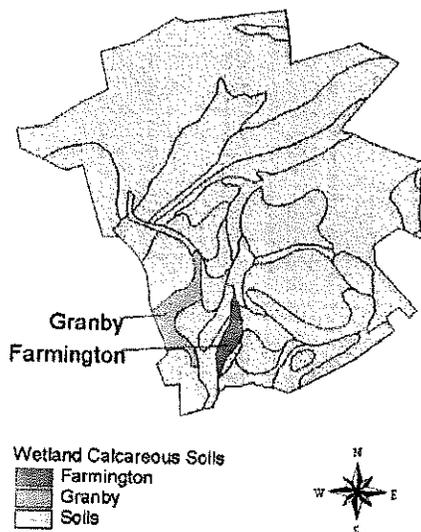


Figure 41: Map of lowland calcareous soils.

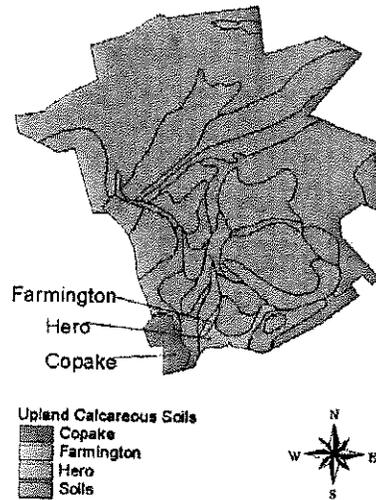


Figure 42: Map of upland calcareous soils.

4.7.3: Calcareous Wetlands

The calcium rich marble that underlays the eastern portions of Meeker Swamp create a unique wetland habitat that is rare in Connecticut. Most wetlands in the temperate zone of New England contain acidic soils (often pH levels between 3.0 and 6.0) due to the slow decomposition of organic material within the anaerobic environment. Calcareous wetlands differ in that the calcium rich bedrock leaches into the surrounding soils, providing a more basic soil profile than the typical wetland (pH ranges from 6.0 to 7.8). This combination of hydric soils and basic pH allows for rare calcicolous plant species and unique communities (New Hampshire DEP 2002).

4.7.4: Vernal Pools

Vernal pools are unique ecological features that support a variety of vertebrate and invertebrate species. Typically under a few acres in size and shallow, they usually appear only in the spring as a result of snowmelt and spring

runoff. However, rainstorms and other isolated precipitation events can also facilitate their persistence through the autumn and winter. They are found in depressions in the landscape, such as kettle holes and swales (Massachusetts Natural Heritage and Endangered Species Program website 2002).

Because of the lack of year-round water flow, vernal pools cannot support fish species. Pools that approach permanent water presence are no exception; the low levels of dissolved oxygen resulting from significant draw-downs create conditions hostile to fish survival. This attribute makes vernal pools ideal habitat for breeding amphibians because of the absence of predators that would feed on their eggs (Massachusetts Natural Heritage and Endangered Species Program website 2002). Jefferson's salamanders (*Ambystoma jeffersonianum*) and Spotted salamanders (*Ambystoma maculatum*) converge on vernal pools in the early spring to mate and lay their eggs before departing for their woods homes. Marbled salamanders also use vernal pools to lay their eggs in the summer, when the pools are dry, and hatch following autumn rains. Green frogs (*Rana clamitans*) and wood frogs (*Rana sylvatica*) are also both commonly found in vernal pools (Connecticut Amphibians 2002). Invertebrates such as fairy shrimp are a good indicator of a true vernal pool.

Vernal pools are threatened in Connecticut by development pressures and wetland draining. They are protected under Connecticut State Law by the Inland Wetlands and Watercourses Act (183 C. 532, 539. Inland wetlands and watercourses act, Secs. 22a-28-22a-45), which defines them as a watercourse. We have found several vernal pools in the Macricostas Preserve, notably the area occupied by the Black Gum stand, as well as alongside the existing trail to the Pinnacle. Because of the unique habitat provided by vernal pools, every

effort should be made to preserve them.

4.8: Wildlife

A comprehensive field sample of the fauna of Macricostas Preserve was not undertaken for the creation of this management plan. However, an assessment of the probable presence of a variety of New England, faunal species was made, for both forested and non-forested areas based on the unique features of the stand types described in the ecological context section of this plan. A computer program, discussed in detail in Appendix F was used to determine what animal species might be found across the diverse cover types of Macricostas Preserve. Species Occurrence Tables (SOT) were developed (Appendix F, Tables 7A and 8A), demonstrating the results of the program simulation in an easy to read fashion. The aforementioned SOT were summarized (Appendix F, Tables 7A and 8A).

In addition to the creation of the SOT, numerous observations were made by the management team while collecting the biophysical data. Signs of deer browse and tracks were evident throughout the corn fields and animal paths were evident in the marshes. The presence of the beaver colony in stand 2 was evidenced by the beaver pond/dam, visible from the above ridgetop and by tree girdling in and around the pond area. The occasional squirrel or chipmunk was witnessed, as well as a variety of birds in and around the meadows and cropland. Few amphibians were witnessed, however, many areas offering unique habitats utilized by amphibians were found and recorded by GPS. For example, vernal pools in the northern stands, possible habitat for the spotted salamander, were discovered, along with many cavity trees, snags and logs of varying sizes.



Beavers have been actively colonizing the wetland areas.

**4.8.1: Species Occurrence by Habitat:
Nonforested Areas** (See Appendix F, Wildlife,
Table 7A)

The northern stands, for the most part forested, include a number of small ledges and rocky outcroppings, and talus slopes, that are ideal for a variety of wildlife species.

Poikilothermic animals, such as snakes, utilize such rocky areas for sunning in order to maintain their internal body temperatures, while predators, such as the golden eagle perch on high snags often found on exposed ridgetops. Small mammals, such as rats, mice, and bats, find shelter under the numerous rocks and boulders abundant in the northern stands, and serve as a food source that attracts predators such as snakes and birds of prey.

The southern, predominately non-forested, stands were found to hold the greatest capacity for bird species with habitat for 112 bird species. The greatest concentration of bird species was found to favor the site conditions offered by the cultivated areas of the cornfield and the fallow fields (Table 1).

A total of 185 species are found to occur on the non-forested stand types present on Macricostas Preserve. Among the listed species are common species such as the

Jefferson salamander, spotted salamander, red-eared slider, and black rat snake, as well as a few endangered species such as the bog turtle and the American bittern (Table 7A). It is important to emphasize that these species were not observed, but may be found on such sites as those present on the property. The species designated by the Connecticut Department of Environmental Protection that may be found on Macricostas Preserve are listed and organized by habitat in Table 7A

The presence of the vernal pools in stand 13 has demonstrated not only the ecological significance of the variation inherent in that stand, but also the importance and delicate structure of the vernal pool ecosystem. Once such features are identified, efforts can be made to assure the protection of the pools and the amphibian and invertebrate species that rely on them.

**4.8.2: Species Occurrence by Habitat:
Forested Areas** (See Appendix F, Wildlife,
Table 8A)

Table 8A lists 96 species likely to occur in the forested stands and areas. Some of the species may be present in more than one habitat type, depending on their individual site needs. The distribution of these species is as would be expected, with a majority of the amphibians in the Red Maple swamp border and the larger mammals in the mast producing northern hardwoods (Table 2). Among the species listed are common species such as the wild turkey and gray squirrel, and also the unlikely moose. Some of the species found on the cover types offered by the Macricostas Preserve are classified as Threatened, Endangered, or of Special Concern (Table 8A). It is important to emphasize that these species were not observed, but may be found on such sites as those present on the property.

The species designated by the Connecticut Department of Environmental Protection that may be found on Macricostas Preserve are listed and organized by habitat in (Table 8A). Many of the forested areas, such as the hemlock in stand 13, provide an ideal habitat for deer which rely on the thick cover for shelter and bedding in the winter. The hemlock is also considered important cover for ruffed grouse, turkeys, and many other animals (USDA, 1990). The hemlock does not constitute a large portion of stand 13 but is present in sufficient area to offer winter shelter to deer. As previously mentioned, numerous deer signs were observed, and hunting is a part of the historical context of the property. Also, hemlock stands provide a unique habitat that is utilized by 15 other animal species (Table 8A). The most animal species are likely to be found in the mast producing, northern hardwoods (Table 2). The vertical structure of the forest provides high perches for birds of prey as well as low ground cover for numerous prey species. A total of 47 species are

found in the northern hardwoods (Table 2). The actual forested stands of Macricostas Preserve are considerably more complex than those delineated for the purposes of this section, but the limitations of the utilized program make it difficult to recreate a complex forest ecosystem. The stand delineations used for the wildlife assessment are general, but readily apply to Macricostas Preserve.

The SOT demonstrate the wide range of faunal species that may occur on a site as diverse as Macricostas Preserve. In addition to the amphibians, reptiles, and mammals listed in the tables, numerous species of avifauna are also present. The landscape of Macricostas Preserve is incredibly varied and offers a rare opportunity to birdwatchers. Due to the sheer magnitude of the number of bird species that would find suitable habitat on Macricostas Preserve, it is necessary to do a systematic inventory, perhaps with the assistance of local birders.

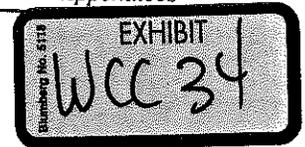
| | Upland field | | | | Palustrine and Riverine | | | | | | | Other | | | | Upland field | Palustrine | Riverine | Other |
|-------------------|--------------|-------|-----------------|---------|-------------------------|---------------|-------------|-----|--------|----------|-------------|-------|-----------------|------------------------|----|--------------|------------|----------|-------|
| | Cultivated | Grass | Shrub/old field | Pasture | Sedge meadow | Shallow marsh | Shrub swamp | Bog | Stream | Riparian | Ledge/cliff | Cave | Derelict build. | | | | | | |
| Amphibians | 0 | 0 | 0 | 0 | 1 | 2 | 0 | 3 | 6 | 4 | 0 | 0 | 0 | Endangered | 3 | 3 | 1 | 0 | |
| Reptiles | 1 | 2 | 1 | 4 | 3 | 1 | 0 | 1 | 2 | 5 | 2 | 0 | 3 | Threatened | 6 | 8 | 1 | 3 | |
| Birds | 21 | 24 | 7 | 13 | 2 | 21 | 14 | 8 | 1 | 21 | 3 | 0 | 9 | Special Concern | 8 | 13 | 7 | 2 | |
| Mammals | 5 | 7 | 7 | 4 | 8 | 13 | 14 | 11 | 10 | 13 | 2 | 6 | 11 | Totals | 17 | 24 | 9 | 5 | |
| Totals | 27 | 33 | 15 | 21 | 14 | 37 | 28 | 23 | 19 | 43 | 7 | 6 | 23 | | | | | | |

Table 1: Number of unique species cross-referenced with species type and non-forested habitat type (left) and number of listed species cross-referenced by non-forested habitat type (right)

| | Non-forested habitat type | | | | | Forested habitat type | | | |
|-------------------|---------------------------|--------------|------------|---------|------------------------|-----------------------|--------------|------------|---------|
| | Red Maple | N. Hardwoods | N. Red Oak | Hemlock | | Red Maple | N. Hardwoods | N. Red Oak | Hemlock |
| Amphibians | 7 | 0 | 0 | 0 | Endangered | 7 | 0 | 0 | 0 |
| Reptiles | 3 | 1 | 1 | 1 | Threatened | 3 | 1 | 1 | 1 |
| Birds | 26 | 32 | 11 | 7 | Special Concern | 26 | 32 | 11 | 7 |
| Mammals | 4 | 14 | 3 | 7 | totals | 36 | 33 | 12 | 8 |
| totals | 40 | 47 | 15 | 15 | | | | | |

Table 2: Number of unique species cross-referenced with species type and non-forested habitat type (left) and number of listed species cross-referenced by forested habitat type (right)

Appendix F: Wildlife



The following Species Occurrence Tables were created through the use of the program NEWILD, a single aspect of the NED collection of software tools developed by the US Department of Agriculture, Forest Service, Northeastern Forest Experiment Station. NEWILD was designed to assist the user in the evaluation of wildlife habitats, both forested and non-forested, through the use of the Species/Habitat matrices developed by DeGraaf et al. The computer program cross references the habitat specifications, entered by the user, to a database of 338 species of fauna that are found to occur in the state of Connecticut and throughout New England (Thomasma et al., 1998). The format of the following tables was adapted from the aforementioned matrices developed by DeGraaf et al. The common and scientific names are provided for each species, as well as any pertinent habitat needs. Any one species may be found to occur in multiple habitat types across the landscape dependent upon the habitat needs of the species in question.

When entering the habitat specifications, the user is required to enter whether the selected habitat attributes are either "utilized" or "preferred" in their seasonal use by the animal species likely to occur on them. For the purposes of this management plan, the species were assumed to prefer the habitats present on Macricostas Preserve. For Table 7A this data was not included in the table due to the complex construction of the table. However, Table 8A is simpler in format and the seasonal preferences (breeding season, breeding and feeding, winter, and winter feeding) for each species were listed for reference by the reader. To make the table easier to reference, the species are broken up into groups (amphibians, reptiles, birds, and mammals) and species listed by the Connecticut Department of Environmental Protection are so indicated.

Cover types delineated for Table 7A: habitat, non-forested areas

Table 7A depicts the possible combinations of animal species that may occur on the various, non-forested cover types present on Macricostas Preserve. The various habitats represented are:

Upland field – represents features of stands 2, 7, 8, 10 and 12
Cultivated – the cornfield and the mown area of the dedication site
Grass – the marshy area north of the dedication site and the abandoned agricultural sites
Shrub/old field – the abandoned agricultural sites and edge areas around said sites
Pasture – the fallow fields and the grassy areas around the dedication site

Palustrine – represents features of stands 2 and 7
Sedge meadow – the grassy marsh north of the dedication site and the grassy marsh of stand 2
Shallow marsh – the marshy areas of stand 2
Shrub swamp – the tussock grass swamp of stand 2, the marshy areas of stands 1 and 9
Bog – the beaver pond of stand 2 and the vernal pools in stand 13

Riverine – Bee Brook as it passes through stand 2 and between stands 12 and 10

Stream – Bee Brook

Riparian – all areas immediately adjacent to Bee Brook, portions of stands 2, 10 and 12

Other – represents features of stands 3, 4, 5, 6 and 13

Ledge/cliff – the exposed, rock faces separating stands 3 and 4

Cave – the caves and rocky outcroppings created by the boulders and exposed rock faces of stands 3, 4, 5, 6, and 13

Derelected buildings/structures – the detritus of the agricultural context of the southern stands and the occasional homestead site found on the northern stands

Cover types delineated for Table 8A: habitat, forested areas

Table 8A depicts the possible combinations of animals that may occur on the various, forested cover types present on Macricostas Preserve. The various habitats represented are:

Red Maple – represents features of stands 1, 2 and 3

Northern Hardwoods – stands 4, 5, 6, and 13

Northern Red Oak – though no pure stands of Northern Red Oak were discovered, it was deemed necessary to include it as a distinct cover type for the purpose of this wildlife assessment, as it was a major component in the canopy of all the cover types of the northern stands, and was present in isolated pockets throughout

Eastern Hemlock – represents the unique “woodlots” of stand 13, discussed in detail in the ecological context of this management plan

Table 7A: Species Occurrence Table, by habitat, non-forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Upland field | | | | Palustrine and Riverine | | | | | Other | | | |
|---|--|--------------|-------|-----------------|---------|-------------------------|---------------|-------------|-----|--------|----------|-------------|------|-------------------|
| | | Cultivated | Grass | Shrub/old field | Pasture | Sedge meadow | Shallow marsh | Shrub swamp | Bog | Stream | Riparian | Ledge/cliff | Cave | Derelected build. |
| Amphibians | | | | | | | | | | | | | | |
| Mudpuppy <i>Necturus m. maculos</i> | Moving water | | | | | | | | | | | | | |
| Jefferson Salamander <i>Ambystoma jeffersonianu</i> | Temporary pools for breeding | | | | | | | | | | | | | |
| Northern Dusky Salamander <i>Desmognathus f. fusc</i> | Permanent streams or seeps in woodland | | | | | | | | | | | | | |
| Mountain Dusky Salamander <i>Desmognathus ochrophae</i> | Woodland seeps, springs or stream | | | | | | | | | | | | | |
| Four-toed Salamander <i>Hemidactylum scutatur</i> | Wet woodlands | | | | | | | | | | | | | |
| Northern Spring Salamander <i>Gyrinophilus p. prophyriticu</i> | Streams, seeps or springs | | | | | | | | | | | | | |
| Northern Spring Peeper <i>Hyla c. crucife</i> | Pools for breeding | | | | | | | | | | | | | |
| Northern Two-lined Salamander <i>Eurycea b. bislineal</i> | Alkaline streams for breeding | | | | | | | | | | | | | |
| Green Frog <i>Rana clamitans melanc</i> | Riparian areas | | | | | | | | | | | | | |
| Mink Frog <i>Rana septentrional</i> | Breeds and hibernates in permanent wate | | | | | | | | | | | | | |
| Northern Leopard Frog <i>Rana pipien</i> | Wet meadows | | | | | | | | | | | | | |
| Pickerel Frog <i>Rana palustri</i> | Shallow, clear water of bogs and woodland ponds for breedi | | | | | | | | | | | | | |
| Reptiles | | | | | | | | | | | | | | |
| Spotted Turtle <i>Clemmys gutta</i> | Unpolluted shallow water | | | | | | | | | | | | | |
| Bog Turtle <i>Clemmys muhlenber</i> | Wet meadow in full sun | | | | | | | | | | | | | |
| Wood Turtle <i>Rana sylvatic</i> | Prefers temporary woodland pools, slow moving streai | | | | | | | | | | | | | |
| Red-eared Slider <i>Psuedemys scripta eleg</i> | Quiet water, muddy bottom, thick veg, log for basking | | | | | | | | | | | | | |
| Midland Painted Turtle <i>Chrysemys picta margina</i> | Aquatic habitats | | | | | | | | | | | | | |
| Blanding's Turtle <i>Emydoidea blanding</i> | Shallow waters with soft muddy bottoms and aquatic veg. | | | | | | | | | | | | | |

Table 7A: Species Occurrence Table, by habitat, non-forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Upland field | | | Palustrine and Riverine | | | | | Other | | | | |
|--|--|--------------|-------|-----------------|-------------------------|--------------|---------------|-------------|-----|--------|----------|-------------|------|-----------------|
| | | Cultivated | Grass | Shrub/old field | Pasture | Sedge meadow | Shallow marsh | Shrub swamp | Bog | Stream | Riparian | Ledge/cliff | Cave | Derelict build. |
| Eastern Spiny Softshell <i>Trionyx s. spinifer</i> | Shallow muddy bottoms for burrowing | | | | | | | | | | | | | |
| Northern Brown Snake <i>Storeria d. dekayi</i> | | | | | | | | | | | | | | |
| Eastern Ribbon Snake <i>Thamnophis s. saur</i> | Mesic woodlands with aquatic habita | | | | | | | | | | | | | |
| Eastern Hognose Snake <i>Heterodon platyrhinc</i> | Sandy soils, open woodlands | | | | | | | | | | | | | |
| Eastern Worm Snake <i>Carphophis a. amoen</i> | Loose soil for burrowing, cover object | | | | | | | | | | | | | |
| Northern Black Racer <i>Coluber c. constrict</i> | | | | | | | | | | | | | | |
| Eastern Smooth Green Snake <i>Ophedrys v. vernali</i> | Upland grassy opening | | | | | | | | | | | | | |
| Black Rat Snake <i>Elaphe o. obsolet</i> | | | | | | | | | | | | | | |
| Eastern Milk Snake <i>Lampropeltis t. triangulur</i> | Suitable cover or loose soil for egg laying | | | | | | | | | | | | | |
| Northern Copperhead <i>Agkistrodon contortrix mokes</i> | Rocky hillsides, talus slopes | | | | | | | | | | | | | |
| Timber Rattlesnake <i>Crotalus horridu</i> | Rock outcroppings on forested hillsides | | | | | | | | | | | | | |
| Birds | | | | | | | | | | | | | | |
| Pied-billed Grebe <i>Podilymbus podice</i> | Birds need open water to beco airborne, aqu. ve | | | | | | | | | | | | | |
| American Bittern <i>Botaurus lentiginos</i> | Tail marsh vegetation such as cattails and bulrush | | | | | | | | | | | | | |
| Least Bittern <i>Ixobrychus exili</i> | Deep marshes with clumps of emergent vegetati | | | | | | | | | | | | | |
| Great Blue Heron <i>Ardea herodia</i> | Generally require tall tree for nesting | | | | | | | | | | | | | |
| Green-backed Heron <i>Butorides striatu</i> | | | | | | | | | | | | | | |
| Black-crowned Night-Heron <i>Nycticorax nycticora</i> | | | | | | | | | | | | | | |
| Yellow-crowned Night-Heron <i>Nycticorax violacet</i> | | | | | | | | | | | | | | |

Table 7A: Species Occurrence Table, by habitat, non-forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Upland field | | | Palustrine and Riverine | | | | | Other | | |
|---|--|--------------|-------|----------------------------|-------------------------|---------------|-------------|-----|--------|----------|-------------|---------------------------|
| | | Cultivated | Grass | Pasture Shrub/old field | Sedge meadow | Shallow marsh | Shrub swamp | Bog | Stream | Riparian | Ledge/cliff | Derelected build. Cave |
| Glossy Ibis ^{SC} <i>Plegadis falcinellu</i> | | | | | | | | | | | | |
| Canada Goose <i>Branta canadens</i> | Shallow water, abundant plant foods | | | | | | | | | | | |
| Wood Duck <i>Aix spons</i> | Trees at least 6 in dbh with large cavities for nesting | | | | | | | | | | | |
| Green-winged Teal <i>Anas crecc</i> | | | | | | | | | | | | |
| American Black Duck <i>Anas rubripe</i> | | | | | | | | | | | | |
| Mallard <i>Anas platyrhynch</i> | Shallow water (less than 41cm deep) | | | | | | | | | | | |
| Blue-winged Teal <i>Anas discor</i> | | | | | | | | | | | | |
| Northern Shoveler <i>Anas clypeat</i> | Shallow bodies of water with muddy bottoms, tall gra | | | | | | | | | | | |
| Turkey Vulture <i>Cathartes aur.</i> | Clearings in which carrion can easily sighte | | | | | | | | | | | |
| Northern Harrier ^F <i>Circus cyanel.</i> | | | | | | | | | | | | |
| Red-shouldered Hawk ^{SC} <i>Buteo lineatu</i> | Cool, moist, lowland forests with tall trees for nesting | | | | | | | | | | | |
| Broad-winged Hawk <i>Buteo platypteru</i> | Extensive woodlands | | | | | | | | | | | |
| Red-tailed Hawk <i>Buteo jamaicens</i> | Large trees for nesting and perching | | | | | | | | | | | |
| Rough-legged Hawk <i>Buteo lagopu</i> | Open country | | | | | | | | | | | |
| Golden Eagle <i>Aquila chrysaetc</i> | Elevated nest sites, especially cliffs, open land for huntir | | | | | | | | | | | |
| American Kestrel ^{SC} <i>Falco sparveriu</i> | Nest trees with dbh greater than 30.5 cm, elevated perch | | | | | | | | | | | |
| Peregrine Falcon ^F <i>Falco peregrinu</i> | High cliffs, clear view of surrounding | | | | | | | | | | | |
| Gray Partridge <i>Perdix perdi:</i> | Availability of grain crops and grasslands for cov | | | | | | | | | | | |
| Ring-necked Pheasant <i>Phasianus colchici</i> | | | | | | | | | | | | |

Table 7A: Species Occurrence Table, by habitat, non-forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Upland field | | | | Palustrine and Riverine | | | | | Other | | |
|---|--|--------------|-------|-----------------|---------|-------------------------|---------------|-------------|-----|--------|----------|-------------|------|
| | | Cultivated | Grass | Shrub/old field | Pasture | Sedge meadow | Shallow marsh | Shrub swamp | Bog | Stream | Riparian | Ledge/cliff | Cave |
| Northern Bobwhite <i>Colinus virginianus</i> | Edges, well drained sandy or loamy soils, dense cov | ■ | | | | | | | | | | | |
| King Rail ^F <i>Rallus elegans</i> | Adequate vegetation for nesting, consistant wat | | | | | ■ | | | | | | | |
| Virginia Rail <i>Rallus limicola</i> | Wetlands with sedge and cattail edge | | | | | ■ | | | | | | | |
| Sora <i>Buteo jamaicens</i> | Large trees for nesting and perching | | | | | ■ | | | | | | | |
| Common Moorhen <i>Gallinula chloropus</i> | Emergent vegetation growing in water 0.5 to 0.9 m deep, or | | | | | ■ | | | | | | | |
| Killdeer <i>Charadrius vociferus</i> | Open fields or waste areas with sparse vegetati | ■ | | | | | | | | | | | |
| Spotted Sandpiper <i>Actitis macularia</i> | | | | | | | | ■ | | | | | |
| Upland Sandpiper <i>Bartamia longicaud</i> | | | | ■ | | | | | | | | | |
| Common Snipe <i>Gallinago gallinago</i> | Moist, organic soils, scanty vegetation for nest and bro | | | | | | ■ | | | | | | |
| American Woodcock <i>Scolopax minor</i> | Fertile, moist soil that contains earthworm | | | ■ | | | | | | | | | |
| Black Tern <i>Chlidonias niger</i> | | | | | | ■ | | | | | | | |
| Rock Dove <i>Columba livia</i> | | ■ | | | | | | | | | | ■ | |
| Mourning Dove <i>Zenaidura macroura</i> | Open land with bare ground that produces see | ■ | | | | | | | | | | | |
| Common Barn-Owl <i>Tyto alba</i> | Abundant supply of rodents, structures for nesting | ■ | | | | | | | | | | ■ | |
| Eastern Screech-Owl <i>Otus asio</i> | Cavities for nesting and roosting trees (min dbh 30.5 c | | | | | ■ | | | ■ | | | | |
| Snowy Owl <i>Nyctea scandiaca</i> | | ■ | | | | | | | | | | | |
| Northern Hawk-Owl <i>Surnia ulula</i> | | | | | | | | ■ | | | | | |
| Barred Owl <i>Strix varia</i> | Cool, damp lowlands, large trees with cavities for nesting | | | | | | | | ■ | | | | |
| Great Gray Owl <i>Strix nebulosus</i> | | | | | | | | ■ | | | | | |

Table 7A: Species Occurrence Table, by habitat, non-forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Upland field | | | | Palustrine and Riverine | | | | | Other | | |
|--|--|--------------|-------|-----------------|---------|-------------------------|---------------|-------------|-----|--------|----------|-------------|------|
| | | Cultivated | Grass | Shrub/old field | Pasture | Sedge meadow | Shallow marsh | Shrub swamp | Bog | Stream | Riparian | Ledge/cliff | Cave |
| Boreal Owl <i>Aegolius funereus</i> | | | | | | | | | | | | | |
| Chimney Swift <i>Chaetura pelagic</i> | Chimneys | | | | | | | | | | | | |
| Belted Kingfisher <i>Ceryle alcyon</i> | Banks for nest sites within a mile of water | | | | | | | | | | | | |
| Red-bellied Woodpecker <i>Melanerpes carolin</i> | Extensive mature woodlands w dead trees for nest | | | | | | | | | | | | |
| Northern Flicker <i>Colaptes auratus</i> | Medium to large dead or dying trees for nesting | | | | | | | | | | | | |
| Olive-sided Flycatcher <i>Contopus borealis</i> | | | | | | | | | | | | | |
| Eastern Wood-Pewee <i>Contopus virens</i> | | | | | | | | | | | | | |
| Yellow-bellied Flycatcher <i>Empidonax flaviventris</i> | Coniferous forests, low wet areas | | | | | | | | | | | | |
| Alder Flycatcher ^{SC} <i>Empidonax alnorum</i> | Areas with dense, low shrubs and clearings (edge) | | | | | | | | | | | | |
| Willow Flycatcher <i>Empidonax traillii</i> | Low trees and shrubs with clearings (edge) | | | | | | | | | | | | |
| Eastern Phoebe <i>Sayornis phoebe</i> | Perches 1.5 to 4.6 m high, clearing | | | | | | | | | | | | |
| Horned Lark <i>Eremophila alpestris</i> | Bare exposed earth within territory | | | | | | | | | | | | |
| Tree Swallow <i>Tachycineta bicolor</i> | Cavity for nesting (min dbh 25.4 cm), open feeding area | | | | | | | | | | | | |
| Northern Rough-winged Swallow <i>Stelgidopteryx serripennis</i> | | | | | | | | | | | | | |
| Bank Swallow <i>Riparia riparia</i> | Sand or clay banks stabilized by grassy mat overhanging | | | | | | | | | | | | |
| Cliff Swallow <i>Hirundo pyrrhonotus</i> | Open foraging areas, vertical wall with overhang for nesting | | | | | | | | | | | | |
| Barn Swallow <i>Hirundo rustica</i> | Man-made structures for nesting | | | | | | | | | | | | |
| Common Raven ^{SC} <i>Corvus corax</i> | Cliffs or tall trees for nesting | | | | | | | | | | | | |
| American Crow <i>Corvus brachyrhynchos</i> | | | | | | | | | | | | | |

Table 7A: Species Occurrence Table, by habitat, non-forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Upland field | | | | Palustrine and Riverine | | | | | Other | | | |
|---|--|--------------|-------|-----------------|---------|-------------------------|---------------|-------------|-----|--------|----------|-------------|------|------------------|
| | | Cultivated | Grass | Shrub/old field | Pasture | Sedge meadow | Shallow marsh | Shrub swamp | Bog | Stream | Riparian | Ledge/cliff | Cave | Derehcted build. |
| Tufted Titmouse <i>Parus bicolo</i> | Nesting cavities, commonly in mixed wood | | | | | | | | | | | | | |
| House Wren <i>Troglodytes aedc</i> | Cavity for nesting, minimum dbh of 25.4 cm | | | | | | | | | | | | | |
| Sedge Wren <i>Cistothorus platens</i> | Sedge meadows | | | | | | | | | | | | | |
| Veery <i>Catharus fuscesce</i> | Moist woodlands with understory of low trees/shrub | | | | | | | | | | | | | |
| American Robin <i>Turdus migratoriu</i> | | | | | | | | | | | | | | |
| Gray Catbird <i>Dumetella carolinens</i> | Low, dense, woody vegetation for nesting | | | | | | | | | | | | | |
| Northern Mockingbird <i>Mimus polyglotto</i> | Low, dense woody vegetation, perches, edible fruit | | | | | | | | | | | | | |
| Brown Thrasher ^{SC} <i>Toxostoma rufu</i> | Low, dense woody vegetation for nesting and cov. | | | | | | | | | | | | | |
| Northern Shrike <i>Lanius excubitor</i> | Elevated perches, short vegetation | | | | | | | | | | | | | |
| European Starling <i>Sturnus vulgaris</i> | Cavities for nesting, min dbh of 25.4 cm | | | | | | | | | | | | | |
| White-eyed Vireo <i>Vireo griseu</i> | Low shrubby veg. providing foraging and nesting | | | | | | | | | | | | | |
| Blue-winged Warbler <i>Vermivora pinu</i> | Old fields with scattered shrubs and small trees | | | | | | | | | | | | | |
| Golden-winged Warbler <i>Vermivora chrysoptera</i> | Brushy open areas, especially clearings in deciduous woodland | | | | | | | | | | | | | |
| Yellow Warbler <i>Dendroica petechi</i> | Scattered small trees or shrubbery | | | | | | | | | | | | | |
| Palm Warbler <i>Dendroica palmarum</i> | | | | | | | | | | | | | | |
| Cerulean Warbler <i>Dendroica cerulea</i> | Tall deciduous trees | | | | | | | | | | | | | |
| Prothonotary Warbler <i>Protonotaria citrea</i> | Cavity for nesting, border between water and thick deciduous cover | | | | | | | | | | | | | |
| Northern Waterthrush <i>Seiurus noveboracensis</i> | Cool, shady, wet ground with open pools of shallow water | | | | | | | | | | | | | |
| Louisiana Waterthrush <i>Seiurus motacilla</i> | Woodlands with flowing water, especially streams and brooks | | | | | | | | | | | | | |

Table 7A: Species Occurrence Table, by habitat, non-forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Upland field | | | | Palustrine and Riverine | | | | | Other | | |
|--|--|--------------|-------|-----------------|---------|-------------------------|---------------|-------------|-----|--------|----------|-------------|------|
| | | Cultivated | Grass | Shrub/old field | Pasture | Sedge meadow | Shallow marsh | Shrub swamp | Bog | Stream | Riparian | Ledge/cliff | Cave |
| Common Yellowthroat <i>Geothlypis trichas</i> | | | | | ■ | | ■ | | | ■ | | | |
| Hooded Warbler <i>Wilsonia citrina</i> | Low, dense, woody dec. vegetation | | | | | | ■ | | | | | | |
| Wilson's Warbler <i>Wilsonia pusilla</i> | | | | | | | | ■ | | | | | |
| Yellow-breasted Chat <i>Icteria virens</i> | Dense shrubs and vines with scattered young tree | | | | ■ | | | | | ■ | | | |
| Indigo Bunting <i>Passerina cyanea</i> | Brushy vegetation, elevated perches | | ■ | | | | | | | | | | |
| Field Sparrow <i>Spizella pusilla</i> | Open areas with low shrubs or trees | | ■ | | ■ | | | | | | | | |
| Vesper Sparrow <i>Pooecetes graminea</i> | Open areas with short herbaceous vegetation | | ■ | | | | | | | | | | |
| Savannah Sparrow ^{SC} <i>Passerculus sandwichensis</i> | Grasses and other vegetation of moderate height | | ■ | | | | | | | | | | |
| Grasshopper Sparrow <i>Ammodramus saviannus</i> | Continuous tall herb. cover, perches for singing | | ■ | | | | | | | | | | |
| Henslow's Sparrow ^{SC} <i>Ammodramus henslowii</i> | Dense herbaceous veg, mod. amounts of moisture, perches | | | | | ■ | | | | | | | |
| Fox Sparrow <i>Passerella iliaca</i> | | | | | ■ | | | | | | | | |
| Song Sparrow <i>Melospiza melodia</i> | Songposts (elevated perches) | | ■ | | | | ■ | | | ■ | | | |
| Lincoln's Sparrow <i>Melospiza lincolni</i> | Needs brushy growth 1.2 to 2.4 m, with openings of grass | | | | | | | ■ | | | | | |
| Swamp Sparrow <i>Melospiza georgiana</i> | | | | | | | ■ | | | | | | |
| White-throated Sparrow <i>Zonotrichia albicollis</i> | | | | | ■ | | | | | | | | |
| Lapland Longspur <i>Calcarius lapponicus</i> | | ■ | | | | | | | | | | | |
| Snow Bunting <i>Plectrophenax nivalis</i> | | ■ | | | | | | | | | | | |
| Bobolink <i>Dolichonyx oryzivorus</i> | Large expanses of grassland or forb cover | | ■ | | | | | | | | | | |
| Red-winged Blackbird <i>Agelaius phoeniceus</i> | Sites for night roosting close to food supply | | ■ | | | | ■ | | | | | | |

Table 7A: Species Occurrence Table, by habitat, non-forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Upland field | | | | Palustrine and Riverine | | | | | Other | | | |
|--|--|--------------|-------|-----------------|---------|-------------------------|---------------|-------------|-----|--------|----------|-------------|------|-----------------|
| | | Cultivated | Grass | Shrub/old field | Pasture | Sedge meadow | Shallow marsh | Shrub swamp | Bog | Stream | Riparian | Ledge/cliff | Cave | Derelict/built. |
| Eastern Meadowlark <i>Sturnella magna</i> | Grasslands, elevated singing perch | | ■ | | | | | | | | | | | |
| Rusty Blackbird <i>Euphagus carolinus</i> | | | | | | | | ■ | | | | | | |
| Common Grackle <i>Quiscalus quiscul</i> | | ■ | | | | | | ■ | | | | | | |
| Brown-headed Cowbird <i>Molothrus ater</i> | | ■ | | | | | | | | | | | | |
| Common Redpoll <i>Carduelis famme</i> | | | ■ | | | | | | | | | | | |
| Hoary Redpoll <i>Carduelis hornemani</i> | | | ■ | | | | | | | | | | | |
| Pine Siskin <i>Carduelis pinu</i> | Conifers | | ■ | | | | | | | | | | | |
| American Goldfinch <i>Carduelis tristis</i> | Open, weedy fields, scattered woody growth for nesting | | | | ■ | | | ■ | | | ■ | | | |
| House Sparrow <i>Passer domestic</i> | | ■ | | | | | | | | | | | | ■ |

Mammals

| | | | | | | | | | | | | | | |
|--|---|--|---|--|---|--|--|---|---|---|---|--|--|---|
| Virginia Opossum <i>Didelphis virginianus</i> | Den - burrow, tree cavity, log, brush pile or water | | | | | | | ■ | | | ■ | | | |
| Masked Shrew <i>Sorex cinereus</i> | High humidity, ground cover | | | | | | | | ■ | | | | | |
| Water Shrew <i>Sorex palustris</i> | Herbaceous cover, body of cold water (bog, stream, lake) | | | | | | | ■ | | | | | | |
| Smokey Shrew <i>Sorex fumex</i> | Loose damp leaf litter, for escape | | | | | | | | ■ | | | | | |
| Northern Short-tailed Shrew <i>Blarina brevicauda</i> | Low vegetation, loose leaf litter, high humidity | | | | | | | ■ | | | | | | |
| Least Shrew <i>Cryptotis parvus</i> | Loose soils for tunnels | | ■ | | | | | | | | | | | |
| Eastern Mole <i>Scalopus aquaticus</i> | Soft moist soils containing earthworm | | | | ■ | | | | | | | | | |
| Star-nosed Mole <i>Condylura cristata</i> | Wet, mucky humus | | | | | | | ■ | | | | | | |
| Little Brown Myotis <i>Myotis lucifugus</i> | Females seek dark, warm sites, males cooler daytime roost | | | | | | | | | ■ | | | | ■ |

Table 7A: Species Occurrence Table, by habitat, non-forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Upland field | | | Palustrine and Riverine | | | | | Other | | |
|---|--|--------------|-------|----------------------------|-------------------------|---------------|-------------|-----|--------|----------|-------------|------|
| | | Cultivated | Grass | Pasture Shrub/old field | Sedge meadow | Shallow marsh | Shrub swamp | Bog | Stream | Riparian | Ledge/cliff | Cave |
| Keen's Myotis Myotis keen | Caves or mine shafts with air ²⁰ F. calr | | | | | | | | | | | |
| Indiana Myotis Myotis sodali | Caves for hibernation with cool temperature | | | | | | | | | | | |
| Small-footed Myotis Myotis leibii | Tolerates cold, dry places for hibernation | | | | | | | | | | | |
| Silver-haired Bat ^{SC} Lasionycteris noctivagax | Dead trees with loose bark or cavities for summer roost | | | | | | | | | | | |
| Eastern Pipistrelle Pipistrellus subflav. | Warm, draft free, damp sites for hibernation | | | | | | | | | | | |
| Big Brown Rat Eptesicus fusc. | Seems to require cold, dry areas of caves/buildings for hiber | | | | | | | | | | | |
| Eastern Cottontail Sylvilagus floridanu | Year round protection from storms and cold weath | | | | | | | | | | | |
| New England Cottontail Sylvilagus transitionali | Young woodlands with thick cover, seldom far from cov | | | | | | | | | | | |
| Snowshoe Hare Lepus american | Dense brushy cover | | | | | | | | | | | |
| European Hare Lepus capens | Open land | | | | | | | | | | | |
| Woodchuck Marmota mona | Open land | | | | | | | | | | | |
| Beaver Castor canadens | Wetlands with food supply and dept | | | | | | | | | | | |
| Deer Mouse Peromyscus maniculat | | | | | | | | | | | | |
| White-footed Mouse Peromyscus leucop | | | | | | | | | | | | |
| Meadow Vole Microtus pennsylvanic | Herbaceous vegetation, loose organic soil | | | | | | | | | | | |
| Woodland Vole Microtus pinetorum | Groundcover of leaves or grass, moist, well-drained soi | | | | | | | | | | | |
| Muskrat Ondata zibethic | Wetland with dense emergent vegetation and stable wa | | | | | | | | | | | |
| Southern Bog Lemming ^{SC} Synaptomys cooper | Moist soils | | | | | | | | | | | |
| Northern Bog Lemming Synaptomys borea | Moist to wet soils or leaf mold | | | | | | | | | | | |

Table 7A: Species Occurrence Table, by habitat, non-forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Upland field | | | Palustrine and Riverine | | | | | Other | | | | |
|---|---|--------------|-------|-----------------|-------------------------|--------------|---------------|-------------|-----|--------|----------|-------------|------|----------------|
| | | Cultivated | Grass | Shrub/old field | Pasture | Sedge meadow | Shallow marsh | Shrub swamp | Bog | Stream | Riparian | Ledge/cliff | Cave | Derelict/buid. |
| Norway Rat <i>Rattus norvegicus</i> | Buildings, dumps, or loose soil for digging, food supply | | | | | | | | | | | | | |
| House Mouse <i>Mus musculus</i> | Buildings in winter | | | | | | | | | | | | | |
| Meadow Jumping Mouse <i>Zapus hudsonii</i> | Herbaceous groundcover, loose soils for burrowing | | | | | | | | | | | | | |
| Woodland Jumping Mouse <i>Napaeozapus insignis</i> | Moist, cool woodland, loose soils, herbaceous cover | | | | | | | | | | | | | |
| Porcupine <i>Erethizon dorsatum</i> | Den sites in rock ledges, trees or other protected places | | | | | | | | | | | | | |
| Red Fox <i>Vulpes vulpes</i> | Suitable den sites | | | | | | | | | | | | | |
| Raccoon <i>Procyon lotor</i> | Protected areas for dens (3m above ground or near water) | | | | | | | | | | | | | |
| Ermine <i>Mustela ermine</i> | Small rodents, dense brushy cover | | | | | | | | | | | | | |
| Long-tailed Weasel <i>Mustela frenata</i> | Uses previously excavated burrows for den | | | | | | | | | | | | | |
| Mink <i>Mustela vison</i> | Den sites inside hollow logs, cavities near water edge | | | | | | | | | | | | | |
| Striped Skunk <i>Mephitis mephitis</i> | Dens, may be under structures, stumps or in burrow | | | | | | | | | | | | | |
| River Otter <i>Lutra canadensis</i> | Body of water such as a stream, pond, lake, river, den site | | | | | | | | | | | | | |
| Lynx <i>Felis lynx</i> | Secluded den sites, extensive forest | | | | | | | | | | | | | |
| Moose <i>Alces alces</i> | Wetlands preferred in summer | | | | | | | | | | | | | |

^E indicates that the species is endangered (CTDEP, 2002)

^T indicates that the species is threatened (CTDEP, 2002)

^{SC} indicates that the species is of special concern (CTDEP, 2002)

Table 8A: Species Occurrence Table, by habitat, forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Red Maple | Northern Hardwoods | Northern Red Oak | Eastern Hemlock | Breeding Season | Breeding & Feeding | Winter | Winter Feeding |
|---|---|-----------|--------------------|------------------|-----------------|-----------------|--------------------|--------|----------------|
| Amphibians | | | | | | | | | |
| Marbled Salamander <i>Ambystoma opacu</i> | Woodland ponds or swamps for breeding | ■ | | | | ■ | | | |
| Jefferson Salamander ^{BC} <i>Ambystoma jeffersonianum</i> | Temporary pools for breeding | ■ | | | | ■ | | | |
| Spotted Salamander <i>Ambystoma maculatu</i> | Mesic woods, semi-permanent water (pH 7-9) for breeding | ■ | | | | ■ | | | |
| Mountain Dusky Salamander <i>Desmognathus ochrophae</i> | Woodland seeps, springs or stream | ■ | | | | ■ | | | |
| Slimy Salamander <i>Plethodon glutinosu</i> | Rock outcroppings, logs within wooded areas | ■ | | | | ■ | | | |
| Four-toed Salamander <i>Hemidactylum scutatur</i> | Wet woodlands | ■ | | | | ■ | | | |
| Northern Spring Salamander <i>Gyrinophilus p. prophyriticu</i> | Streams, seeps or springs | ■ | | | | ■ | | | |
| Reptiles | | | | | | | | | |
| Eastern Box Turtle <i>Terrapene c. carolin</i> | Old fields, clearings, ecotones with sandy soil | | | ■ | | ■ | | | |
| Five-lined Skink <i>Eumeces fasciat</i> | Open woods with logs and slash piles | ■ | | | | ■ | | | |
| Northern Redbelly Snake <i>Storeria o. occipitamacula</i> | Woodlands | | ■ | | ■ | ■ | | | |
| Eastern Ribbon Snake <i>Thamnophis s. saur</i> | Mesic woodlands with aquatic habita | ■ | | | | ■ | | | |
| Northern Ringneck Snake <i>Diadophis punctatus edward</i> | Mesic conditions with abundant cover | ■ | | | | ■ | | | |
| Birds | | | | | | | | | |
| Green-backed Heron <i>Butorides striatu</i> | | ■ | | | | ■ | | | |
| Sharp-shinned Hawk <i>Accipiter striatu</i> | Extensive open mixed woodlands free from disturbance | | ■ | | | ■ | ■ | ■ | ■ |
| Cooper's Hawk <i>Accipiter cooperi</i> | | | | ■ | | ■ | ■ | ■ | ■ |
| Northern Goshawk <i>Accipiter gentili</i> | Extensive mixed woodlands with large trees for nesting | | ■ | | | ■ | ■ | | |
| Broad-winged Hawk <i>Buteo platypteru</i> | Extensive woodlands | | ■ | | | ■ | | | |

Table 8A: Species Occurrence Table, by habitat, forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Red Maple | Northern Hardwoods | Northern Red Oak | Eastern Hemlock | Breeding Season | Breeding & Feeding | Winter | Winter Feeding |
|---|---|-----------|--------------------|------------------|-----------------|-----------------|--------------------|--------|----------------|
| Red-tailed Hawk <i>Buteo jamaicens</i> | Large trees for nesting and perching | ■ | □ | □ | □ | □ | ■ | □ | ■ |
| Wild Turkey <i>Meleagris gallopav</i> | Mast-producing woodlands, large conifers, abundant wa | □ | ■ | ■ | □ | □ | □ | ■ | ■ |
| American Woodcock <i>Scolopax minc</i> | Fertile, moist soil that contains earthworm | ■ | ■ | □ | □ | ■ | □ | □ | □ |
| Black-billed Cuckoo <i>Coccyzus erythrophalm</i> | Low, dense, shrubby vegetation | □ | □ | ■ | □ | ■ | ■ | □ | □ |
| Eastern Screech-Owl <i>Otus asi</i> | Cavities for nesting and roosting (min 30.5 cm dbh) | ■ | □ | □ | □ | □ | ■ | □ | ■ |
| Great Horned Owl <i>Bubo virginianu</i> | Large abandoned birds' nests or large cavities for nestin | □ | □ | □ | ■ | ■ | □ | □ | □ |
| Great Gray Owl <i>Strix nebulos</i> | | ■ | □ | □ | □ | □ | □ | □ | ■ |
| Long-eared Owl <i>Asio otu</i> | Dense vegetation for nesting and roosting cove | □ | □ | □ | ■ | ■ | ■ | □ | □ |
| Northern Saw-whet Owl ^{SC1} <i>Aegolius acadict</i> | Cavity tree with a minimum of 30.5 cm db | ■ | ■ | □ | □ | ■ | ■ | ■ | ■ |
| Whip-poor-will ^{SC} <i>Caprimulgus vocifer</i> | | □ | ■ | ■ | □ | ■ | ■ | □ | □ |
| Ruby-throated Hummingbird <i>Archilochus colubri</i> | Abundant flowers, preferably red | □ | ■ | ■ | □ | ■ | ■ | □ | □ |
| Downy Woodpecker <i>Picoides pubesce</i> | Trees greater than 15.2 cm dbh nesting | □ | ■ | □ | □ | ■ | ■ | ■ | ■ |
| Hairy Woodpecker <i>Picoides villosu</i> | Trees with dbh of 25.4 cm or larger for nestin | □ | ■ | □ | □ | ■ | ■ | ■ | ■ |
| Northern Flicker <i>Colaptes auratu</i> | Medium to large dead or dying trees for nesting, 30 cm d | □ | ■ | □ | □ | □ | ■ | □ | □ |
| Alder Flycatcher ^{SC} <i>Empidonax alnoru</i> | Areas with dense, low shrubs and clearings (edge) | ■ | □ | □ | □ | ■ | ■ | □ | □ |
| Willow Flycatcher <i>Empidonax traillii</i> | Low trees and shrubs with clearings (edge) | □ | ■ | □ | □ | ■ | ■ | □ | □ |
| Least Flycatcher <i>Empidonax minim</i> | Open deciduous forest, mod. vegetated woodlan | ■ | ■ | □ | □ | ■ | ■ | □ | □ |
| Tree Swallow <i>Tachycinata bicolc</i> | Cavity for nesting (min. dbh if 25,4 cm), open are | ■ | □ | □ | □ | □ | ■ | □ | □ |
| Blue Jay <i>Cyanocitta cristat</i> | | ■ | ■ | ■ | ■ | ■ | □ | □ | □ |

Table 8A: Species Occurrence Table, by habitat, forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Red Maple | Northern Hardwoods | Northern Red Oak | Eastern Hemlock | Breeding Season | Breeding & Feeding | Winter | Winter Feeding |
|--|---|-----------|--------------------|------------------|-----------------|-----------------|--------------------|--------|----------------|
| Red-breasted Nuthatch <i>Sitta canadens</i> | Coniferous woods, cavity trees (min 30.5 cm dbf) | | | | ■ | ■ | ■ | ■ | ■ |
| White-breasted Nuthatch <i>Sitta carolinensi</i> | Natural cavities for nesting, minimum 30.5 cm dbf | | ■ | | | ■ | ■ | ■ | ■ |
| Carolina Wren <i>Thyrothorus ludoviciani</i> | Low brushy vegetation | ■ | | | | ■ | ■ | ■ | ■ |
| Eastern Bluebird <i>Sialia sialis</i> | Low cavities for nesting, abundant perches for foraging | | ■ | | | ■ | ■ | | |
| Blue-gray Gnatcatcher <i>Poliophtila caerulea</i> | Abundant supply of arthropods | ■ | | | | ■ | ■ | | |
| Veery <i>Catharus fuscescens</i> | Moist woodlands with understory of low trees/shrub | ■ | ■ | | | ■ | ■ | | |
| Swainson's Thrush <i>Catharus ustulatus</i> | Coniferous or mixed forests | | ■ | | | ■ | ■ | | |
| Hermit Thrush <i>Catharus guttatus</i> | Coniferous or mixed woodlands with dense undergrowth | | | | ■ | ■ | ■ | | |
| Wood Thrush <i>Hylocichla ustulata mustelina</i> | Dec. or mixed forest with tall trees and sapling | | ■ | | | ■ | ■ | | |
| Northern Mockingbird <i>Mimus polyglottos</i> | Low, dense woody vegetation, perches, edible fruit | ■ | | | | ■ | ■ | ■ | ■ |
| Cedar Waxwing <i>Bombicilla cedrorum</i> | | ■ | | | | ■ | ■ | ■ | ■ |
| White-eyed Vireo <i>Vireo griseus</i> | Low shrubby veg. providing forage and nesting | ■ | | | | ■ | ■ | | |
| Solitary Vireo <i>Vireo solitarius</i> | | | | | ■ | ■ | ■ | | |
| Red-eyed Vireo <i>Vireo olivaceus</i> | Deciduous trees, continuous canopy | | ■ | | | ■ | ■ | | |
| Tennessee Warbler <i>Vermivora peregrina</i> | Bushy, semi-open country | | ■ | | | ■ | ■ | | |
| Northern Parula <i>Parula americana</i> | use lichen or nest in bearded lichen | | ■ | | | ■ | ■ | | |
| Yellow Warbler <i>Dendroica petechia</i> | Scattered small trees or shrubs | ■ | | | | ■ | ■ | | |
| Chestnut-sided Warbler <i>Dendroica pensylvanica</i> | Early second growth, hardwood regeneration | ■ | ■ | | | ■ | ■ | | |
| Black-throated Blue Warbler <i>Dendroica caerulescens</i> | Woodland with thick, shrubby undergrowth | | ■ | | | ■ | ■ | | |

Table 8A: Species Occurrence Table, by habitat, forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Red Maple | Northern Hardwoods | Northern Red Oak | Eastern Hemlock | Breeding Season | Breeding & Feeding | Winter | Winter Feeding |
|--|--|-----------|--------------------|------------------|-----------------|-----------------|--------------------|--------|----------------|
| Yellow-rumped Warbler <i>Dendroica coronat</i> | Coniferous trees (summer), bayberry thickets (winter) | ■ | □ | □ | □ | ■ | ■ | □ | □ |
| Black-throated Green Warbler <i>Dendroica virens</i> | Coniferous or mixed woodlands | □ | ■ | □ | ■ | ■ | ■ | □ | □ |
| Blackburnian Warbler <i>Dendroica fusc</i> | Coniferous woodlands | □ | □ | ■ | □ | ■ | ■ | □ | □ |
| American Redstart <i>Setophaga ruticilla</i> | | □ | ■ | □ | □ | ■ | ■ | □ | □ |
| Ovenbird <i>Seiurus aurocapillus</i> | | □ | ■ | ■ | □ | ■ | ■ | □ | □ |
| Mourning Warbler <i>Oporornis philadelphia</i> | Extensive stands of dense saplings, shrub | ■ | ■ | □ | □ | ■ | ■ | □ | □ |
| Common Yellowthroat <i>Geothlypis trichas</i> | | ■ | ■ | □ | □ | ■ | ■ | □ | □ |
| Hooded Warbler <i>Wilsonia citrina</i> | Low, dense, woody decid. vegetation | ■ | □ | □ | □ | ■ | ■ | □ | □ |
| Canada Warbler <i>Wilsonia canadensis</i> | | □ | □ | ■ | □ | ■ | ■ | □ | □ |
| Scarlet Tanager <i>Piranga olivacea</i> | Deciduous or mixed woodlands | □ | ■ | □ | □ | ■ | ■ | □ | □ |
| Northern Cardinal <i>Cardinalis cardinalis</i> | Heavy underbrush (<i>Lonicera</i> spp. or <i>Cornus</i> spp.) | ■ | □ | □ | □ | ■ | ■ | ■ | ■ |
| Rose-breasted Grosbeak <i>Pheucticus ludovicianus</i> | An edge: interface of tall trees, fields and dense shrub | □ | ■ | ■ | □ | ■ | ■ | □ | □ |
| Rufous-sided Towhee <i>Pipilo erythrophthalmus</i> | Dense brushy cover | □ | □ | ■ | □ | ■ | ■ | □ | □ |
| Song Sparrow <i>Melospiza melodia</i> | Songposts (elevated perches) | ■ | □ | □ | □ | ■ | ■ | ■ | ■ |
| Common Grackle <i>Quiscalus quiscula</i> | | ■ | □ | □ | □ | ■ | ■ | □ | □ |
| Hoary Redpoll <i>Carduelis horreorum</i> | | □ | ■ | □ | □ | □ | □ | □ | ■ |
| American Goldfinch <i>Carduelis tristis</i> | Open, weedy fields, scattered woody growth for nesting | ■ | □ | □ | □ | ■ | ■ | ■ | ■ |
| Mammals | | | | | | | | | |
| Virginia Opossum <i>Didelphis virginiana</i> | Den - burrow, tree cavity, log, brush pile or water | ■ | □ | □ | □ | □ | ■ | □ | ■ |

Table 8A: Species Occurrence Table, by habitat, forested areas. Adapted from DeGraaf et al.

| SPECIES | SPECIAL HABITAT NEEDS | Red Maple | Northern Hardwoods | Northern Red Oak | Eastern Hemlock | Breeding Season | Breeding & Feeding | Winter | Winter Feeding |
|--|---|-----------|--------------------|------------------|-----------------|-----------------|--------------------|--------|----------------|
| Smokey Shrew <i>Sorex fumet</i> | Loose damp leaf litter, for escape | | ■ | | | ■ | ■ | ■ | ■ |
| Eastern Cottontail <i>Sylvilagus floridanu</i> | Year round protection from storm and cold weather | | ■ | | | | | ■ | ■ |
| New England Cottontail <i>Sylvilagus transitionali</i> | Young woodlands with thick cover, seldom far from cov | ■ | | | | | | | |
| Gray Squirrel <i>Sciurus carolinens</i> | Oaks, tall trees (dens and leaf nests - 7.6 m above ground) | | | ■ | | ■ | ■ | ■ | ■ |
| Red Squirrel <i>Tamiasciurus hudsonic</i> | Woodlands with mature trees, conifers preferred | | | | ■ | ■ | ■ | ■ | ■ |
| Southern Flying Squirrel <i>Glaucmys volar</i> | Several nest sites per individual, cavity trees (ent. of 40-50m) | | ■ | ■ | | ■ | ■ | ■ | ■ |
| Northern Flying Squirrel <i>Glaucmys sabrin</i> | Mature trees, cavities for winter dens, arboreal lichens for food | | ■ | | | ■ | ■ | ■ | ■ |
| Beaver <i>Castor canadens</i> | Wetlands with food supply and depth | ■ | | | | | | | |
| Deer Mouse <i>Peromyscus maniculat</i> | | | | | ■ | ■ | ■ | ■ | ■ |
| White-footed Mouse <i>Peromyscus leucop</i> | | | ■ | ■ | | ■ | ■ | ■ | ■ |
| Southern Red-backed Vole <i>Clethrionomys gapperi gal</i> | Mossy rocks, cool, moist forest | | ■ | | ■ | ■ | ■ | ■ | ■ |
| Woodland Jumping Mouse <i>Napaeozapus insign</i> | Moist, cool woodland, loose soils herbaceous cov | ■ | ■ | | | ■ | ■ | ■ | |
| Porcupine <i>Erethizon dorsatu</i> | Den sites in rock ledges, trees or other protected plac | | ■ | | ■ | ■ | ■ | ■ | ■ |
| Red Fox <i>Vulpes vulpe</i> | Suitable den sites | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Gray Fox <i>Urocyon cinereoargente</i> | Hollow logs, tree cavities, crevice: | ■ | ■ | ■ | | ■ | ■ | ■ | ■ |
| Black Bear <i>Ursus american</i> | Den sites, hollow logs and trees, rock ledges, protected an | ■ | ■ | ■ | | | ■ | | |
| Raccoon <i>Procyon lot</i> | Protected areas for dens (3m above ground or near wat | ■ | | | | | ■ | | ■ |
| Marten <i>Martes american</i> | Den sites (hollow logs and trees) | | | | ■ | ■ | ■ | ■ | ■ |
| Fisher <i>Martes pennan</i> | Dens in hollow trees, logs, ground holes, etc | | ■ | | | | ■ | | ■ |

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| SPECIES | SPECIAL HABITAT NEEDS | Red Maple | Northern Hardwoods | Northern Red Oak | Eastern Hemlock | Breeding Season | Breeding & Feeding | Winter | Winter Feeding |
|--|--|-----------|--------------------|------------------|-----------------|-----------------|--------------------|--------|----------------|
| Mink <i>Mustela vison</i> | Den sites (cavities or hollow logs) near water | ■ | □ | □ | □ | ■ | ■ | ■ | ■ |
| Lynx ² <i>Felus lynx</i> | Secluded den sites, extensive forest | ■ | ■ | □ | □ | □ | ■ | ■ | ■ |
| White-tailed Deer <i>Odocoileus virginianus</i> | Dense cover for winter shelter, adequate brow | □ | ■ | □ | ■ | □ | ■ | ■ | □ |
| Moose <i>Alces alces</i> | Wetlands preferred in summer | ■ | □ | □ | □ | □ | ■ | ■ | ■ |

^E indicates that the species is endangered (CTDEP, 2002)

^T indicates that the species is threatened (CTDEP, 2002)

^{sc} indicates that the species is of special concern (CTDEP, 2002)

¹ Northern Saw-whet Owl - prefers Red Maple for breeding and feeding and winter feeding, but prefers Northern Hardwoods for breeding, breeding and feeding, wintering, and winter feeding

² Lynx - prefers Red Maple for breeding and feeding, wintering, and winter feeding, but prefers Northern Hardwoods for breeding and feeding and winter feeding

³ White Tailed Deer - prefers Hemlock for wintering, but prefers Northern Hardwoods for breeding and feeding

Appendix C: Master Species Lists

Species identified in the Macricostas Preserve by the
Management Team.

| Common Name | Scientific Name | Life form |
|---------------------|-----------------------------------|-----------|
| American chestnut | <i>Castanea dentata</i> | tree |
| American elm | <i>Ulmus americana</i> | tree |
| bitternut hickory | <i>Carya cordiformis</i> | tree |
| black birch | <i>Betula lenta</i> | tree |
| black cherry | <i>Prunus serotina</i> | tree |
| black gum | <i>Nyssa sylvatica</i> | tree |
| chestnut oak | <i>Quercus prinus</i> | tree |
| choke cherry | <i>Prunus virginiana</i> | tree |
| dogwood | <i>Cornus</i> spp. | tree |
| eastern hemlock | <i>Tsuga canadensis</i> | tree |
| eastern hophornbeam | <i>Ostrya virginiana</i> | tree |
| gray birch | <i>Betula populifolia</i> | tree |
| hawthorn | <i>Craetagus</i> spp. | tree |
| hazel | <i>Corylus americana</i> | tree |
| musclewood | <i>Carpinus caroliniana</i> | tree |
| northern red oak | <i>Quercus rubra</i> | tree |
| paper birch | <i>Betula papyrifera</i> | tree |
| pignut hickory | <i>Carya glabra</i> | tree |
| pin cherry | <i>Prunus pennsylvanica</i> | tree |
| pin oak | <i>Quercus palustris</i> | tree |
| quaking aspen | <i>Populus tremuloides</i> | tree |
| red maple | <i>Acer rubrum</i> | tree |
| sassafras | <i>Sassafras albidum</i> | tree |
| scrub oak | <i>Quercus ilicifolia</i> | tree |
| shadbush | <i>Amelanchier</i> spp. | tree |
| shagbark hickory | <i>Carya ovata</i> | tree |
| swamp white oak | <i>Quercus bicolor</i> | tree |
| white ash | <i>Fraxinus americana</i> | tree |
| witch hazel | <i>Hamamelis virginiana</i> | tree |
| yellow birch | <i>Betula alleghaniensis</i> | tree |
| arrowwood | <i>Viburnum dentatum</i> | shrub |
| barberry | <i>Berberis vulgaris</i> | shrub |
| beech fern | <i>Thelypteris phegopteris</i> | fern |
| beggar's tick | <i>Desmodium</i> spp. | herb |
| blackberry | <i>Rubus</i> spp. | shrub |
| blood root | <i>Sanguinaria canadensis</i> | herb |
| bracken fern | <i>Pteridium aquilinum</i> | fern |
| burning bush | <i>Euonymus atropurpurea</i> | shrub |
| Canada mayflower | <i>Maianthemum canadense</i> | herb |
| cattails | <i>Typha</i> spp. | herb |
| christmas fern | <i>Polystichum acrostichoides</i> | fern |
| cinnamon fern | <i>Osmunda cinnamomea</i> | fern |
| cleaver | <i>Galium aparine</i> | herb |
| club moss | <i>Lycopodium</i> spp. | herb |
| dewberry | <i>Rubus hispida</i> | herb |



| Common Name | Scientific Name | Life form |
|----------------------|------------------------------------|-----------|
| early meadow rue | <i>Thalictrum dioicum</i> | herb |
| evergreen wood-fern | <i>Dryopteris</i> spp. | fern |
| garlic mustard | <i>Alliaria petiolata</i> | herb |
| goldenrod | <i>Solidago</i> spp. | herb |
| grass | <i>Andropogon</i> spp. | herb |
| hay-scented fern | <i>Dennstaedtia punctilobula</i> | fern |
| high-bush blueberry | <i>Vaccinium corymbosum</i> | shrub |
| huckleberry | <i>Gaylussacia baccata</i> | shrub |
| indian pipe | <i>Monotropa uniflora</i> | herb |
| indian tobacco | <i>Lobelia inflata</i> | herb |
| interrupted fern | <i>Osmunda claytoniana</i> | fern |
| jewelweed | <i>Impatiens</i> spp. | herb |
| lady fern | <i>Athyrium filix-femina</i> | fern |
| leucothoe | <i>Leucothoe</i> spp. | herb |
| lily | <i>Lilium</i> spp. | herb |
| low bush blueberry | <i>Vaccinium angustifolium</i> | shrub |
| maleflower | <i>Lyonia ligustrina</i> | herb |
| maple-leaf viburnum | <i>Viburnum acerifolium</i> | shrub |
| mountain laurel | <i>Kalmia latifolia</i> | shrub |
| New York fern | <i>Thelypteris noveboracensis</i> | fern |
| oriental bittersweet | <i>Celastrus orbiculata</i> | herb |
| partridge berry | <i>Mitchella repens</i> | herb |
| polytrichum moss | <i>Polytrichum</i> spp. | moss |
| prickly dewberry | <i>Rubus flagellaris</i> | herb |
| rock polypoid | <i>Polypodium polypodioides</i> | fern |
| sedge | <i>Carex pennsylvanica</i> | herb |
| self-heal | <i>Prunella vulgaris</i> | herb |
| sensitive fern | <i>Onoclea sensibilis</i> | fern |
| smooth sumac | <i>Rhus glabra</i> | shrub |
| sphagnum moss | <i>Sphagnum</i> spp. | moss |
| spice bush | <i>Lindera benzoin</i> | shrub |
| spinulose wood fern | <i>Dryopteris spinulosa</i> | fern |
| spotted wintergreen | <i>Chimaphila maculata</i> | herb |
| starflower | <i>Trientalis borealis</i> | herb |
| teasel | <i>Dipsacus</i> spp. | herb |
| trailing arbutus | <i>Epigaea repens</i> | herb |
| tussock grass | <i>Spartina</i> spp. | herb |
| violets | <i>Viola</i> spp. | herb |
| virginia creeper | <i>Parthenocissus quinquefolia</i> | herb |
| white wood aster | <i>Aster divaricatus</i> | herb |
| wild azalea | <i>Rhododendron</i> spp. | shrub |
| wild carrot | <i>Daucus carota</i> | herb |
| wild grape | <i>Vitis labrusca</i> | herb |
| wild ground nut | <i>Phaseolus polystachios</i> | herb |
| wild sarsparilla | <i>Aralia nudicaulis</i> | herb |

| Common Name | Scientific Name | Life form |
|--------------------|--------------------------|------------------|
| willow | <i>Salix</i> spp. | shrub |
| winterberry holly | <i>Ilex verticillata</i> | shrub |

*Species identified by Besty Corrigan, local field
naturalist.*

| <u>Scientific Name</u> | <u>Common Name</u> |
|--|-------------------------------|
| <i>Acer negundo</i> L. | Box Elder |
| <i>Acer pensylvanicum</i> L. | Striped Maple |
| <i>Acer rubrum</i> L. | Red Maple |
| <i>Acer saccharum</i> Marsh. | Sugar Maple |
| <i>Achillea millefolium</i> L. | Common Yarrow |
| <i>Actaea</i> sp. | Baneberry |
| <i>Adiantum pedatum</i> L. | Maidenhair Fern |
| <i>Aegopodium podagraria</i> L. | Goutweed |
| <i>Agrimonia gryposepala</i> Wall. | Hairy Agrimony |
| <i>Alisma subcordatum</i> Raf. | Small-flowered Water Plantain |
| <i>Alnus rugosa</i> (DuRoi) Spreng | Speckled Alder |
| <i>Ambrosia artemisiifolia</i> L. | Common Ragweed |
| <i>Amelanchier canadensis</i> (L.) Medic. | Shadbush |
| <i>Anemone quinquefolia</i> L. | Wood Anemone |
| <i>Anemone virginiana</i> L. | Thimbleweed |
| <i>Anemonella thalictroides</i> (L.) Spach | Rue Anemone |
| <i>Anthemis cotula</i> L. | Dog-fennel |
| <i>Aquilegia canadensis</i> L. | Columbine |
| <i>Arctium lappa</i> L. | Great Burdock |
| <i>Arisaema atrorubens</i> (Ait.) Blume | Jack-in-the-pulpit |
| <i>Aronia</i> sp. | Chokeberry |
| <i>Asarum canadense</i> L. | Wild Ginger |
| <i>Asclepias incarnata</i> L. | Swamp Milkweed |
| <i>Asclepias syriaca</i> L. | Common Milkweed |
| <i>Asplenium platyneuron</i> (L.) Oakes | Ebony Spleenwort |
| <i>Aster</i> sp. | Aster |
| <i>Berberis thunbergii</i> DC | Japanese Barberry |
| <i>Betula alleghaniensis</i> Britt. | Yellow Birch |
| <i>Betula lenta</i> L. | Black Birch |
| <i>Bidens</i> sp. | Beggar-ticks |
| <i>Caltha palustris</i> L. | Marsh-Marigold |
| <i>Calystegia</i> sp. | Bindweed |
| <i>Cardamine</i> sp. | Bittercress |

| <u>Scientific Name</u> | <u>Common Name</u> |
|---|--------------------------|
| <i>Carex</i> sp. | Sedge |
| <i>Carpinus caroliniana</i> Walt. | American Hornbeam |
| <i>Carya ovata</i> (Mill.) K. Koch | Shagbark Hickory |
| <i>Celastrus orbiculatus</i> Thunb. | Asiatic Bittersweet |
| <i>Chelidonium majus</i> L. | Celandine |
| <i>Chimaphila maculata</i> (L.) Pursh | Spotted Wintergreen |
| <i>Chrysosplenium americanum</i> Schwein. | Water Carpet |
| <i>Cichorium intybus</i> L. | Common Chickory |
| <i>Cicuta maculata</i> L. | Spotted Cowbane |
| <i>Circaea quadrisulcata</i> (Maxim.) Franch. & Sav | Enchanter's Nightshade |
| <i>Clematis virginiana</i> L. | Virgin's-bower |
| <i>Cornus alternifolia</i> L. f. | Alternate-leaved Dogwood |
| <i>Cornus racemosa</i> Lam. | Gray Dogwood |
| <i>Corydalis sempervirens</i> (L.) Pers. | Pale Corydalis |
| <i>Corylus</i> sp. | Hazelnut |
| <i>Cuscuta gronovii</i> Willd. | Common Dodder |
| <i>Cystopteris fragilis</i> (L.) Bernh. | Fragile Fern |
| <i>Daucus carota</i> L. | Queen Anne's-lace |
| <i>Dennstaedtia punctilobula</i> (Michx.) Moore | Hay-scented Fern |
| <i>Desmodium</i> sp. | Tick-trefoil |
| <i>Diplazium acrostichoides</i> (Sw.) Butters | Silvery Spleenwort |
| <i>Dipsacus fullonum</i> L. | Teasel |
| <i>Dryopteris cristata</i> (L.) Gray | Crested Wood Fern |
| <i>Dryopteris marginalis</i> (L.) Gray | Marginal Shield Fern |
| <i>Elaeagnus umbellata</i> Thunb. | Autumn Olive |
| <i>Epilobium</i> sp. | Willow-herb |
| <i>Equisteum arvense</i> L. | Common Horsetail |
| <i>Erythronium americanum</i> Ker. | Trout Lily |
| <i>Euonymus alatus</i> (Thunb.) Sieb. | Burning Bush |
| <i>Euonymus fortunei</i> (Turcz.) Hand-Maz. | Climbing Euonymus |
| <i>Eupatorium maculatum</i> L. | Spotted Joe-pye Weed |
| <i>Fagus grandifolia</i> Ehrh. | American Beech |
| <i>Fraxinus americana</i> L. | White Ash |

| <u>Scientific Name</u> | <u>Common Name</u> |
|---|------------------------------|
| <i>Galeopsis tetrahit</i> L. | Hemp-nettle |
| <i>Galium asprellum</i> Michx. | Rough Bedstraw |
| <i>Geranium maculatum</i> L. | Spotted Geranium |
| <i>Glyceria canadensis</i> (Michx.) Trin. | Rattlesnake Grass |
| <i>Goodyera pubescens</i> (Willd.) R. Br. | Downy Rattlesnake-plantain |
| <i>Hamamelis virginiana</i> L. | Witch-hazel |
| <i>Hepatica americana</i> (DC.) Ker. | Round-lobed Hepatica |
| <i>Houstonia caerulea</i> L. | Bluets |
| <i>Hydrocotyle americana</i> L. | Marsh-Pennywort |
| <i>Hypericum boreale</i> (Britt.) Bickn.(?) | Northern St. John's-wort (?) |
| <i>Hypericum ellipticum</i> Hook. | Pale St. John's-wort |
| <i>Ilex verticillata</i> (L.) A. Gray | Winterberry |
| <i>Impatiens capensis</i> Meerb. | Spotted Jewelweed |
| <i>Impatiens pallida</i> Nutt. | Pale Jewelweed |
| <i>Kalmia latifolia</i> L. | Mountain Laurel |
| <i>Leersia oryzoides</i> (L.) Sw. | Rice Cutgrass |
| <i>Lemna</i> sp. | Duckweed |
| <i>Leonurus cardiaca</i> L. | Common Motherwort |
| <i>Lepidium virginicum</i> L. | Wild Peppergrass |
| <i>Ligustrum</i> sp. | Privet |
| <i>Lindera benzoin</i> (L.) Blume | Spice Bush |
| <i>Lobelia cardinalis</i> L. | Cardinal Flower |
| <i>Lobelia inflata</i> L. | Indian Tobacco |
| <i>Lonicera maackii</i> (Rupr.) Maxim | Amur Honeysuckle |
| <i>Lotus corniculatus</i> L. | Birdsfoot Trefoil |
| <i>Lycopodium clavatum</i> L. | Running Pine |
| <i>Lycopodium lucidulum</i> Michx. | Shining Clubmoss |
| <i>Lycopodium tristachyum</i> Pursh. | Ground Cedar |
| <i>Lycopus americanus</i> Muhl. | Cut-leaved Water-Horehound |
| <i>Lysimachia ciliata</i> L. | Fringed-loosestrife |
| <i>Lysimachia terrestris</i> (L.) BSP. | Swamp-candles |
| <i>Lythrum salicaria</i> L. | Purple Loosestrife |
| <i>Maianthemum canadense</i> Desf. | Wild Lily-of-the-Valley |

| <u>Scientific Name</u> | <u>Common Name</u> |
|---|------------------------------|
| <i>Matteuccia struthiopteris</i> (L.) Todaro | Ostrich Fern |
| <i>Melampyrum lineare</i> Desr. | Cow-wheat |
| <i>Mimulus ringens</i> L. | Square-stemmed Monkey-Flower |
| <i>Myosotis laxa</i> Lehm. | Smaller Forget-me-not |
| <i>Myosotis scorpiodes</i> L. | True Forget-me-not |
| <i>Nepeta cataria</i> L. | Catnip |
| <i>Nyssa sylvatica</i> Marsh. | Tupelo |
| <i>Oenothera biennis</i> L. | Common Evening-Primrose |
| <i>Onoclea sensibilis</i> L. | Sensitive Fern |
| <i>Osmorhiza</i> sp. | Sweet Cicely |
| <i>Osmunda cinnamomea</i> L. | Interrupted Fern |
| <i>Ostrya virginiana</i> (Mill.) K. Koch | American Hop-Hornbeam |
| <i>Parthenocissus quinquefolia</i> (L.) Planch | Virginia Creeper |
| <i>Penthorum sedoides</i> L. | Ditch Stonecrop |
| <i>Phalaris canariensis</i> L. | Canary Grass |
| <i>Phleum pratense</i> L. | Timothy |
| <i>Phytolacca americana</i> L. | Pokeweed |
| <i>Pilea pumila</i> (L.) Gray | Clearweed |
| <i>Pinus strobus</i> L. | White Pine |
| <i>Polygonum persicaria</i> (L.) Small | Lady's Thumb |
| <i>Polypodium virginianum</i> L. | Polypody |
| <i>Polystichum acrostichoides</i> (Michx.) Schott | Christmas fern |
| <i>Potamogeton</i> sp. | Pondweed |
| <i>Potentilla canadensis</i> L. | Dwarf Cinquefoil |
| <i>Prunus serotina</i> Ehrh. | Black Cherry |
| <i>Quercus alba</i> L. | White Oak |
| <i>Quercus prinus</i> L. | Chestnut Oak |
| <i>Quercus rubra</i> L. | Red Oak |
| <i>Ranunculus abortivus</i> L. | Small-flowered Crowfoot |
| <i>Ranunculus septentrionalis</i> Poir. | Northern Swamp Buttercup |
| <i>Rhododendron</i> sp. | Azalea |
| <i>Rhus typhina</i> L. | Smooth Sumac |
| <i>Rosa multiflora</i> Thunb. | Multiflora Rose |

| <u>Scientific Name</u> | <u>Common Name</u> |
|--|---------------------------|
| <i>Rubus</i> sp. | Dewberry |
| <i>Rumex crispus</i> L. | Curled Dock |
| <i>Salix</i> sp. | Willow |
| <i>Sambucus canadensis</i> L. | Common Elder |
| <i>Sanguinaria canadensis</i> L. | Bloodroot |
| <i>Sassafras albidum</i> (Nutt.) Nees | Sassafras |
| <i>Scutellaria galericulata</i> L. | Marsh Skullcap |
| <i>Scutellaria laterifolia</i> L. | Mad-dog Skullcap |
| <i>Sisymbrium officinale</i> L. | Hedge Mustard |
| <i>Smilacina racemosa</i> (L.) Desf. | False Solomon's Seal |
| <i>Solanum dulcamara</i> L. | Climbing Nightshade |
| <i>Solidago</i> sp. | Goldenrod |
| <i>Sparganium</i> sp. | Bur-reed |
| <i>Spiraea tomentosa</i> L. | Steeple-bush |
| <i>Spiraea latifolia</i> (Ait.) Borkh. | Meadow-sweet |
| <i>Symplocarpus foetidus</i> (L.) Nutt. | Skunk-cabbage |
| <i>Thalictrum dioicum</i> L. | Meadow-rue |
| <i>Thalictrum polygamum</i> Muhl. | Tall Meadow Rue |
| <i>Thelypteris novaboracensis</i> (L.) Nieuwl. | New York Fern |
| <i>Thelypteris palustris</i> Schott. | Marsh Fern |
| <i>Thelypteris phegopteris</i> (L.) Slosson | Long Beech Fern |
| <i>Tovara virginiana</i> (L.) Raf. | Virginia Knotweed |
| <i>Toxicodendron radicans</i> (L.) Ktze. | Poison Ivy |
| <i>Trientalis borealis</i> Raf. | Star-flower |
| <i>Trillium erectum</i> L. | Red Trillium |
| <i>Tsuga canadensis</i> (L.) Carr | Eastern Hemlock |
| <i>Typha angustifolia</i> L. | Narrow-leaved Cat-tail |
| <i>Typha latifolia</i> L. | Common Cat-tail |
| <i>Urtica dioica</i> L. | Stinging Nettle |
| <i>Vaccinium angustifolium</i> Aiton. | Common Low-bush Blueberry |
| <i>Vaccinium corymbosum</i> L. | High-bush Blueberry |
| <i>Veratrum viride</i> Ait. | False Hellebore |
| <i>Verbascum thapsus</i> L. | Common Mullein |

Scientific Name

Common Name

Verbena hastata L.

Blue Vervain

Viburnum acerifolium L.

Maple-leaved Viburnum

Vicia cracca L.

Cow Vetch

Viola sp.

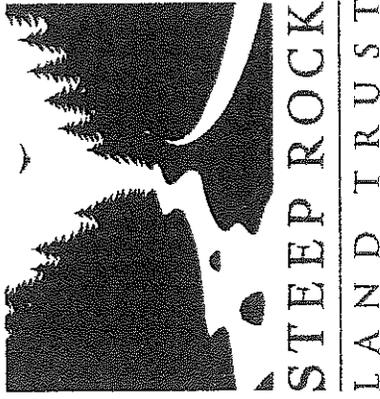
Violet

Vitis sp.

Wild Grape

Zizania aquatica L.

Wild Rice



**STEEL ROCK
LAND TRUST**

| Towhees and Sparrows | Steep Rock | Hidden Valley | Macri- costas |
|------------------------|------------|---------------|------------------|
| Eastern Towhee* | S2 | S3 | S3 |
| American Tree Sparrow | | | W2 |
| Chipping Sparrow* | S2 | S3 | S3 |
| Clay-colored Sparrow | | | M5 |
| Field Sparrow* | S3 | | S3 |
| Vesper Sparrow | | | M5 |
| Savannah Sparrow* | | | S3 |
| Fox Sparrow | | M4 | M4 |
| Song Sparrow* | S3 | S3 | Y1 |
| Lincoln's Sparrow | | | M4 |
| Swamp Sparrow* | | | S3 |
| White-crowned Sparrow | | | M4 |
| White-throated Sparrow | W3 | W3 | W1 |
| Dark-eyed Junco | W3 | W3 | W1 |
| Snow Bunting | | | W4 |

| Cardinals and Grosbeaks | Steep Rock | Hidden Valley | Macri- costas |
|-------------------------|------------|---------------|------------------|
| Northern Cardinal* | Y2 | Y3 | Y2 |
| Rose-breasted Grosbeak* | S3 | S4 | S3 |
| Indigo Bunting* | S4 | | S3 |

| Blackbirds and Orioles | Steep Rock | Hidden Valley | Macri- costas |
|------------------------|------------|---------------|------------------|
| Bobolink | | | Y3 |
| Red-winged Blackbird* | S3 | S3 | S1 |
| Eastern Meadowlark | | | M5 |
| Rusty Blackbird | | | M3 |
| Common Grackle* | | S3 | S3 |
| Brown-headed Cowbird* | S3 | S3 | S2 |
| Baltimore Oriole* | S3 | S3 | S3 |

| Finches | Steep Rock | Hidden Valley | Macri- costas |
|---------------------|------------|---------------|------------------|
| Pine Grosbeak | | | V5 |
| Purple Finch* | Y4 | Y4 | Y4 |
| House Finch* | Y3 | Y3 | Y2 |
| Common Redpoll | V5 | V5 | |
| Pine Siskin* | W5 | | M5 |
| American Goldfinch* | Y2 | Y2 | Y2 |
| Evening Grosbeak | V5 | | V5 |

| Old World Sparrows | Steep Rock | Hidden Valley | Macri- costas |
|--------------------|------------|---------------|------------------|
| House Sparrow* | | | Y2 |

| Steep Rock | Hidden Valley | Macri- costas | |
|-----------------|---------------|------------------|----|
| Wood Thrush* | S3 | S3 | S3 |
| American Robin* | S2 | S2 | Y1 |

| Thrushes | Steep Rock | Hidden Valley | Macri- costas |
|-----------------------|------------|---------------|------------------|
| Gray Catbird* | S1 | S2 | Y1 |
| Northern Mockingbird* | S3 | | Y3 |
| Brown Thrasher* | S5 | | |

| Starlings | Steep Rock | Hidden Valley | Macri- costas |
|-------------------|------------|---------------|------------------|
| European Starling | | | Y3 |

| Pipits | Steep Rock | Hidden Valley | Macri- costas |
|----------------|------------|---------------|------------------|
| American Pipit | | | M3 |

| Waxwings | Steep Rock | Hidden Valley | Macri- costas |
|----------------|------------|---------------|------------------|
| Cedar Waxwing* | Y3 | Y3 | Y3 |

| Wood Warblers | Steep Rock | Hidden Valley | Macri- costas |
|-------------------------------|------------|---------------|------------------|
| Blue-winged Warbler* | S3 | | S3 |
| Tennessee Warbler* | S5 | M5 | M5 |
| Orange-crowned Warbler | | | M5 |
| Nashville Warbler | M4 | M4 | |
| Northern Parula | M3 | M3 | M3 |
| Yellow Warbler* | S3 | S3 | S2 |
| Chestnut-sided Warbler* | S3 | S3 | S2 |
| Magnolia Warbler | M3 | M3 | M3 |
| Cape May Warbler | M5 | | |
| Black-throated Blue Warbler* | S4 | S3 | S2 |
| Yellow-rumped Warbler* | S3 | S3 | S3 |
| Black-throated Green Warbler* | S2 | S2 | S3 |
| Blackburnian Warbler* | S2 | S2 | |
| Pine Warbler* | S3 | S3 | |
| Prairie Warbler* | S2 | | |
| Palm Warbler | M3 | M3 | M2 |
| Bay-breasted Warbler | M4 | M4 | |
| Blackpoll Warbler | M4 | M4 | |
| Cerulean Warbler | M5 | M5 | |
| Black-and-white Warbler* | S2 | S2 | S2 |
| American Redstart* | S3 | S3 | S3 |
| Worm-eating Warbler* | | S4 | S4 |
| Ovenbird* | S2 | S2 | S2 |
| Northern Waterthrush | M4 | M4 | M4 |
| Louisiana Waterthrush* | S2 | S2 | M4 |
| Common Yellowthroat* | S3 | S3 | S1 |
| Wilson's Warbler | | | M4 |
| Canada Warbler* | S5 | | |

| Tanagers | Steep Rock | Hidden Valley | Macri- costas |
|------------------|------------|---------------|------------------|
| Scarlet Tanager* | S2 | S2 | S2 |

Steep Rock

Hidden Valley

Macri-
costas

Checklist of the Birds of Steep Rock

We are indebted to Michael Harwood and the others who created the first Checklist of the Birds of Steep Rock in 1968.

Updated May, 2009



Steep Rock Association, Inc.
P.O. Box 279
Washington Depot, CT 06794
Telephone: 860-868-9131
steeprockassoc.org

- S = Summer Resident
 - M = Migrant
 - Y = Year-round Resident
 - W = Winter Resident
 - V = Occasional Visitor
 - O = Seen primarily in flight overhead
 - * = Known to have bred at Steep Rock
- 1 = Abundant
 - 2 = Common
 - 3 = Fairly Common
 - 4 = Unusual
 - 5 = Rare

Swans, Geese and Ducks Steep Hidden Macri-

| | Rock | Valley | costas |
|----------------------|------|--------|--------|
| Snow Goose | | | MO5 |
| Canada Goose* | Y2 | Y2 | Y2 |
| Wood Duck* | | S3 | S3 |
| American Black Duck* | Y1 | | S3 |
| Mallard* | Y1 | Y2 | S3 |
| Northern Pintail | | | M5 |
| Green-winged Teal | | | M4 |
| Ring-necked Duck | | | M5 |
| Hooded Merganser* | M3 | | S3 |
| Common Merganser* | S3 | S3 | |

Grouse, Turkeys and

| | | | |
|----------------------|----|----|----|
| <u>Quails</u> | | | |
| Ring-necked Pheasant | | | Y3 |
| Ruffed Grouse* | | Y3 | Y4 |
| Wild Turkey* | Y2 | Y2 | Y2 |

Grebes

| | | | |
|-------------------|--|--|----|
| Pied-billed Grebe | | | M5 |
|-------------------|--|--|----|

Loons

| | | | |
|-------------|-----|-----|-----|
| Common Loon | MO5 | MO5 | MO5 |
|-------------|-----|-----|-----|

Cormorants

| | | | |
|--------------------------|-----|-----|-----|
| Double-crested Cormorant | MO4 | MO4 | MO4 |
|--------------------------|-----|-----|-----|

HERONS

| | | | |
|------------------|----|----|----|
| Great Blue Heron | S3 | S3 | S3 |
| Green Heron* | | | S3 |
| American Bittern | | | M5 |

American Vultures

| | | | |
|----------------|----|-----|-----|
| Black Vulture | | YO3 | YO3 |
| Turkey Vulture | S3 | S4 | Y2 |

Eagles and Hawks

| | | | |
|---------------------|-----|-----|-----|
| Osprey | VO4 | VO4 | VO4 |
| Bald Eagle | V5 | | V5 |
| Northern Harrier | | | M3 |
| Sharp-shinned Hawk | M4 | | M3 |
| Cooper's Hawk | M4 | V4 | M3 |
| Northern Goshawk* | Y4 | Y4 | |
| Red-shouldered Hawk | SO4 | | V4 |
| Broad-winged Hawk* | S4 | S5 | M4 |
| Red-tailed Hawk* | VO3 | VO3 | Y2 |

Rails

| | | | |
|---------------|--|--|----|
| Virginia Rail | | | M4 |
|---------------|--|--|----|

Falcons

| | | | |
|------------------|----|--|----|
| American Kestrel | | | M4 |
| Merlin | | | M4 |
| Peregrine Falcon | V5 | | |

Plovers

| | | | |
|----------|--|--|----|
| Killdeer | | | V3 |
|----------|--|--|----|

Sandpipers Steep Hidden Macri-

| | | | | |
|--------------------|--|----|----|----|
| Solitary Sandpiper | | M5 | M3 | M3 |
| Spotted Sandpiper | | M3 | | M5 |
| Least Sandpiper | | | | M4 |
| Wilson's Snipe | | | | S3 |
| American Woodcock* | | S4 | | |

Gulls

| | | | | |
|------------------|--|-----|-----|-----|
| Ring-billed Gull | | VO3 | VO3 | VO3 |
| Herring Gull | | VO3 | VO3 | VO3 |

Pigeons and Doves

| | | | | |
|----------------|--|--|----|----|
| Rock Pigeon* | | | | Y2 |
| Mourning Dove* | | | Y3 | Y2 |

Cuckoos

| | | | | |
|-----------------------|--|--|--|----|
| Black-billed Cuckoo | | | | S4 |
| Yellow-billed Cuckoo* | | | | S4 |

Typical Owls

| | | | | |
|-----------------------|--|----|----|----|
| Eastern Screech-Owl* | | Y3 | Y3 | |
| Great Horned Owl* | | Y3 | Y3 | |
| Barn Owl* | | Y3 | Y3 | Y3 |
| Northern Saw-whet Owl | | M5 | M5 | |

Goatsuckers

| | | | | |
|------------------|--|-----|-----|-----|
| Common Nighthawk | | MO3 | MO3 | MO3 |
|------------------|--|-----|-----|-----|

Swifts

| | | | | |
|----------------|--|-----|--|-----|
| Chimney Swift* | | SO3 | | SO3 |
|----------------|--|-----|--|-----|

Hummingbirds

| | | | | |
|----------------------------|--|--|--|----|
| Ruby-throated Hummingbird* | | | | S4 |
|----------------------------|--|--|--|----|

Kingfishers

| | | | | |
|--------------------|--|----|----|----|
| Belted Kingfisher* | | S2 | S2 | S2 |
|--------------------|--|----|----|----|

Woodpeckers

| | | | | |
|---------------------------|--|----|----|----|
| Red-bellied Woodpecker* | | Y2 | Y2 | Y3 |
| Yellow-bellied Sapsucker* | | S2 | S2 | S2 |
| Downy Woodpecker* | | Y2 | Y2 | Y2 |
| Hairy Woodpecker* | | Y2 | Y2 | Y2 |
| Northern Flicker* | | S3 | S3 | S3 |
| Pileated Woodpecker* | | Y3 | Y3 | Y3 |

Tyrant Flycatchers

| | | | | |
|---------------------------|--|----|----|----|
| Eastern Wood-Pewee* | | S2 | S2 | S2 |
| Acadian Flycatcher* | | S3 | | |
| Alder Flycatcher* | | | | S3 |
| Willow Flycatcher* | | | | S2 |
| Least Flycatcher* | | S4 | S4 | S4 |
| Eastern Phoebe* | | S2 | S2 | S2 |
| Great Crested Flycatcher* | | S2 | S3 | S2 |
| Eastern Kingbird* | | S3 | S3 | S3 |

Shrikes Steep Hidden Macri-

| | | | | |
|------------------------|--|--|--|----|
| <u>Northern Shrike</u> | | | | Y5 |
|------------------------|--|--|--|----|

Vireos

| | | | | |
|------------------------|--|----|----|----|
| Yellow-throated Vireo* | | | S3 | S3 |
| Blue-headed Vireo* | | S3 | S3 | S3 |
| Warbling Vireo* | | S2 | S3 | |
| Philadelphia Vireo | | M5 | | M5 |
| Red-eyed Vireo* | | S2 | S2 | S2 |

Jays and Crows

| | | | | |
|----------------|--|----|----|----|
| Blue Jay* | | Y1 | Y1 | Y1 |
| American Crow* | | Y1 | Y1 | Y1 |
| Fish Crow | | | | V4 |
| Common Raven* | | Y3 | | V4 |

Larks

| | | | | |
|-------------|--|--|--|----|
| Horned Lark | | | | V3 |
|-------------|--|--|--|----|

Swallows

| | | | | |
|-------------------------|--|----|----|----|
| Purple Martin | | | | V5 |
| Tree Swallow* | | S2 | M3 | S1 |
| N. Rough-winged Swallow | | | S3 | |
| Barn Swallow* | | | | S3 |

Chickadees and Titmice

| | | | | |
|-------------------------|--|----|----|----|
| Black-capped Chickadee* | | Y1 | Y1 | Y1 |
| Tufted Titmouse* | | Y1 | Y1 | Y1 |

Nuthatches

| | | | | |
|--------------------------|--|----|----|----|
| Red-breasted Nuthatch* | | | Y5 | |
| White-breasted Nuthatch* | | Y2 | Y2 | Y2 |

Creepers

| | | | | |
|----------------|--|----|----|----|
| Brown Creeper* | | Y3 | Y3 | Y3 |
|----------------|--|----|----|----|

Wrens

| | | | | |
|----------------|--|----|----|----|
| Carolina Wren* | | | | Y3 |
| House Wren* | | S3 | | S2 |
| Winter Wren* | | S3 | S3 | |
| Marsh Wren* | | | | S3 |

Kinglets and Thrushes

| | | | | |
|------------------------|--|----|----|----|
| Golden-crowned Kinglet | | W3 | W2 | W3 |
| Ruby-crowned Kinglet | | M2 | M2 | M2 |
| Blue-gray Gnatcatcher* | | S2 | S2 | S2 |
| Eastern Bluebird* | | Y3 | S4 | Y2 |
| Veery* | | S1 | S1 | S2 |
| Gray-checked Thrush | | M4 | M4 | |
| Swainson's Thrush | | M4 | M4 | |
| Hermit Thrush* | | S3 | S3 | S3 |

State listed species, warblers and other wild life observed/reported in
Diane Dupuis' Nature Journals 2003- 2006

Raven (SC)
Sharp Shinned Hawk (E)
Ribbon Snake (SC)
Wood Turtle (SC)
Leopard Frog (SC)
Bobolink (SC)
Coopers Hawk (T)

Warblers

Black Throated Blue
Black and White
Yellow
Common Yellow Throat
Bay Breasted
Chestnut Sided
Magnolia
Yellow Rumped
Tennessee
Worm Eating Warbler
Yellow Palm

Other Wildlife

Wolf
River Otters
Wood Ducks
Loons
Bear
Bobcat
Coyote
Great Blue Heron



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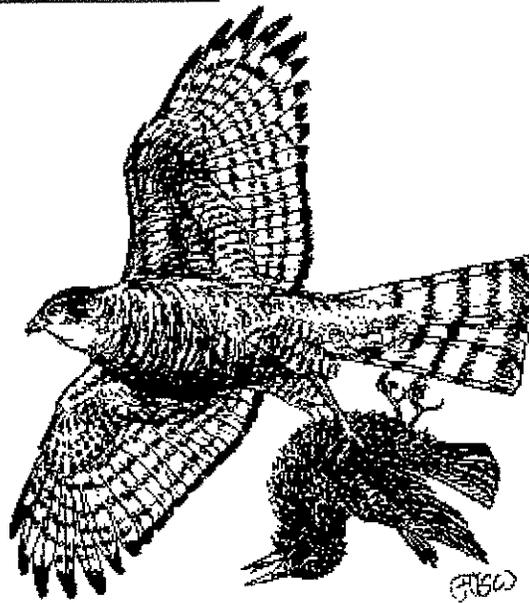
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LOGIN

SHARP-SHINNED HAWK
Accipiter striatus

ENDANGERED



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Habitat: Large, remote, young forests.

Weight: Males, 3-4 ounces; females, 6-8 ounces.

Length: 10-14 inches.

Wingspan: 20-27 inches.

Life Expectancy: Records are scarce. One banded bird lived to be 12 years of age.

Food: Small birds; occasionally mice, shrews, bats, frogs and insects.

Status: State endangered.

Identification: The slender, long-bodied sharp-shinned hawk has short, rounded wings and a long, narrow tail. The adult has a dark, blue-gray back and a rusty-barred breast; immature hawks have more brown, with streaking on the underparts. The sexes are similar in appearance, but the female is about one-third larger than the male. Like all accipiters (a genus of small hawks with short wings and long tails), the sharp-shinned flies with several quick wing beats and a glide. The species is easily confused with the Cooper's hawk, although it is much smaller. Whereas the tail of the Cooper's hawk is well rounded, the tail of the sharp-shinned hawk is nearly square or slightly forked and the tip is not sharply defined, appearing dirty gray.

Range: Sharp-shinned hawks occur throughout most of North America, from

Alaska and Canada south to the Gulf States. However, the species does occur throughout the breeding range in small numbers. In the fall, large numbers of sharp-shinned hawks pass through southern New England as they migrate to the southeastern United States and Central America for the winter.

Reproduction: The breeding season for sharp-shinned hawks is in April and May. A new nest is usually built every year, although the same nesting area may be used for several years. Preferred nesting sites in Connecticut are in young, mixed coniferous/deciduous forests. The nest, built of sticks or twigs and lined with strips of bark, is typically about 2 feet wide. It is well hidden, usually in a stand of conifers, against a tree trunk in a crotch or on a major branch. Generally placed 30 to 35 feet above ground, the nest can be recognized as a broad, rather flat platform of sticks. The 4 to 5 well-rounded eggs are dull white and spotted with varying shades of brown. Incubation, shared by both male and female, takes 34 to 35 days. The young first fly when they are about 23 days old.

Reason for Decline: Sharp-shinned hawk populations declined in the 1970s due to eggshell thinning caused by pesticide contamination in their prey. Although pesticides no longer play as large a role in the decline of sharp-shinned populations today, the species is still affected by other factors, like the loss of habitat. Collisions with plate glass doors and picture windows are responsible for the deaths of many sharp-shinned hawks annually. The glass reflects the surrounding woods and cannot be readily distinguished by a hawk chasing prey or seeking cover.

History in Connecticut: The sharp-shinned hawk is a common migrant from the end of the summer until early November in Connecticut. Some individuals stay in the state during the winter, frequently preying on smaller birds visiting nearby bird feeders. Except for migration counts, reliable population data for Connecticut are scarce. The sharp-shinned is listed as a threatened species in Connecticut due to its small breeding population in the state.

Interesting Facts: In the Northeast, the sharp-shinned hawk is the most common accipiter seen during migration. In Connecticut, sharp-shinned hawks are seldom seen except during fall migration, when they frequent open country, woodland edges and shorelines.

The hawks usually bring their prey to a feeding perch or log. Such logs, and the feathers, fur or animal parts near them, are characteristic of the territory of sharp-shinned hawks and other accipiters.

The sharp-shinned hawk is the smallest North American accipiter. Its short wings and body design allow it to capture other birds while flying through thick woodlands.

This hawk gets its name from its flattened, thin "shins" or shanks.

Protective Legislation: *Federal* - Migratory Bird Treaty Act of 1918. *State* - Connecticut General Statutes Sec. 26-311.

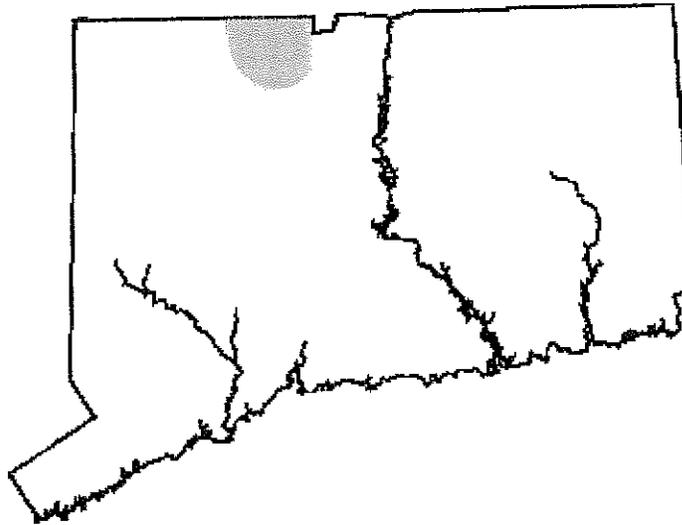
What You Can Do: Although seeing a sharp-shinned hawk at the winter bird feeder preying on favorite songbirds can be traumatic to some feeder watchers, individuals must understand and accept this bird's role in the food chain. Sharp-shinned hawks occur in lower numbers, produce fewer young and breed less often than the songbirds seen at feeders.

Conservation of large blocks of forested habitat will help provide suitable nesting

areas for sharp-shinned hawks. The regulated use of pesticides will help prevent a recurring problem with eggshell thinning and birth defects. Placing silhouettes in windows, or drawing shades or curtains, should minimize bird/glass impacts.

Since woodland nesting species such as the sharp-shinned hawk are often difficult to survey and monitor, any confirmed nests should be reported to the Wildlife Division to help increase our knowledge of the activities of these birds in Connecticut.

Connecticut Range

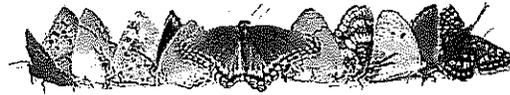


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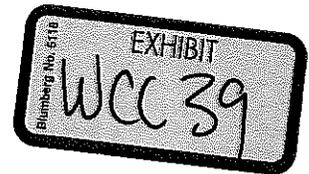
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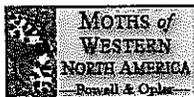
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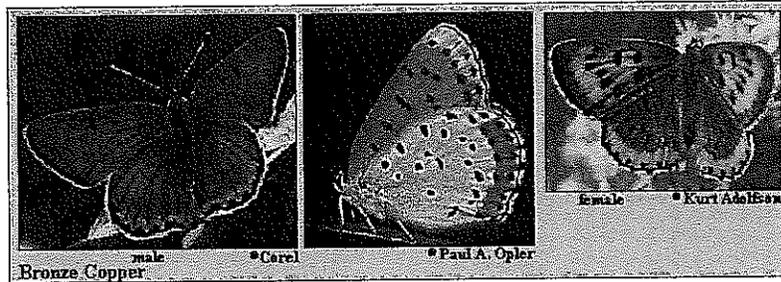
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Bronze Copper

Lycaena hyllus (Cramer, 1775)



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Documented Records for *Lycaena hyllus* in Connecticut

Attributes of *Lycaena hyllus*

Family: Gossamer-wing Butterflies (*Lycaenidae*)

Subfamily: Coppers (*Lycaeninae*)

Identification: Upperside of male iridescent copper-brown; female **forewing** yellow-orange with black spots. Underside forewing of both sexes orange with black spots; underside **hindwing** is gray-white with black spots and a broad orange outer margin.

Life history: Males perch on low growth near host plants to watch for females. Eggs are laid singly on plants. Eggs hibernate until spring; caterpillars eat leaves.

Flight: Two in the north and west, from June-September; three in southern part of range, from May-November.

Wing span: 1 1/4 - 1 7/8 inches (3.2 - 4.8 cm).

Caterpillar hosts: Herbs of the buckwheat family (Polygonaceae) including curly dock (*Rumex crispus*).

Adult food: Adults visit flowers only occasionally, but have been seen taking nectar at blackberry and red clover.

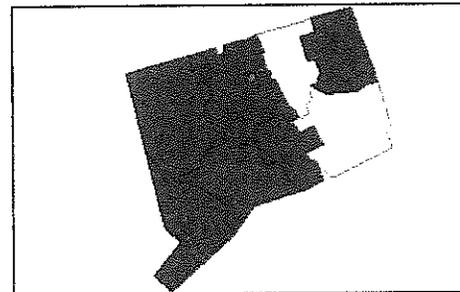
Habitat: Low, wet areas such as bogs, marshes, wet meadows, ponds.

Range: Maine west across southern Canada and the Great Lake states to eastern Montana and central Colorado; south to Arkansas, Mississippi, West Virginia, and Maryland.

Conservation: Not usually required.

NatureServe Global Status: G5 - Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

Management needs: None reported.



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No Record

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Connecticut

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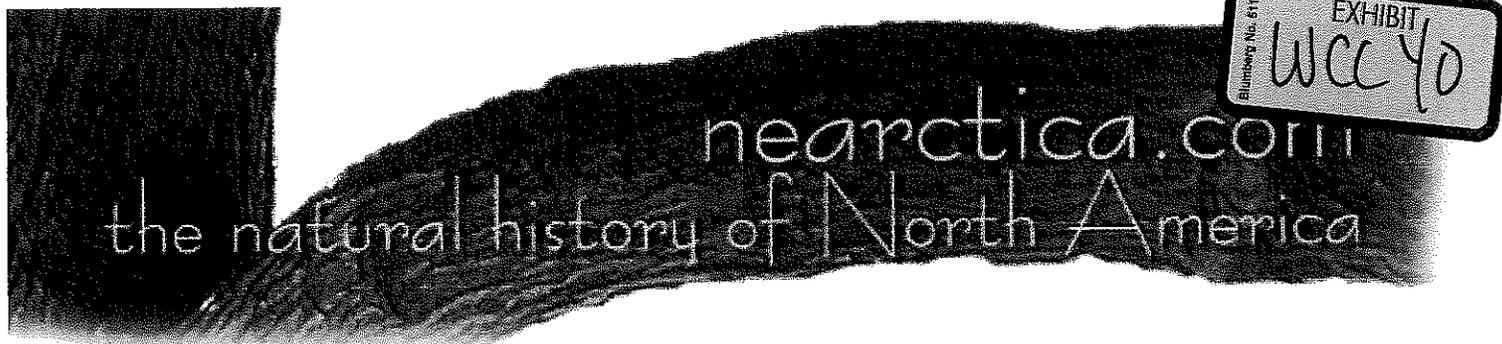
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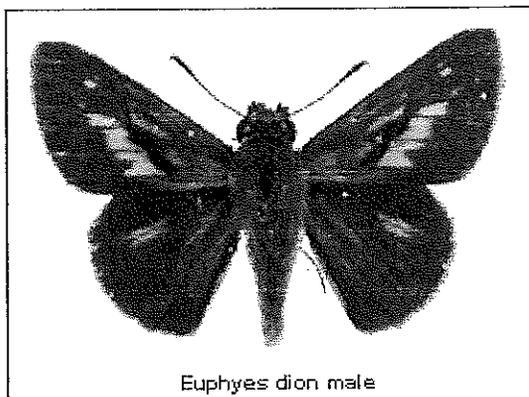


Special Segments

Dion Skipper

General Topics

(*Euphyes dion*)



Euphyes dion male

Dion Skipper (*Euphyes dion* [W. H. Edwards])

Wing span: 1 7/16 - 1 3/4 inches (3.7 - 4.5 cm).

Identification: Upperside of male forewing is dark brown with a central orange area and a black stigma; female forewing is dark brown with light orange spots. Hindwing is dark brown with a wide orange streak. Underside of hindwing is red-brown or orange-brown with 2 yellow-orange streaks running from the base to the margins.

Life history: Males have a very quick flight, are territorial, and perch in marshes in the afternoons to await females; sometimes they patrol in the late morning. Third-stage caterpillars hibernate, emerge in the spring to complete feeding, and pupate in nests of leaves and silk.

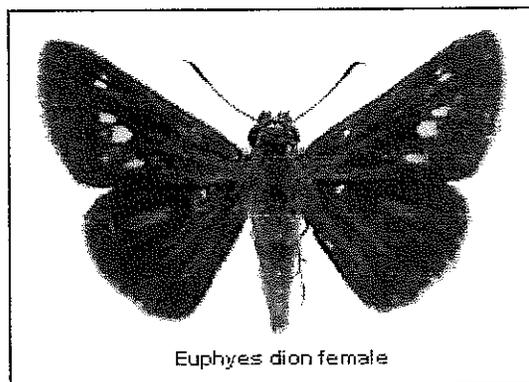
Flight: One brood in the north from July-early August; two broods in the south from May-September.

Caterpillar hosts: Various sedges including woolgrass (*Scirpus cyperinus*), hairy sedge (*Carex lacustris*), and shoreline sedge (*Carex hyalinolepis*).

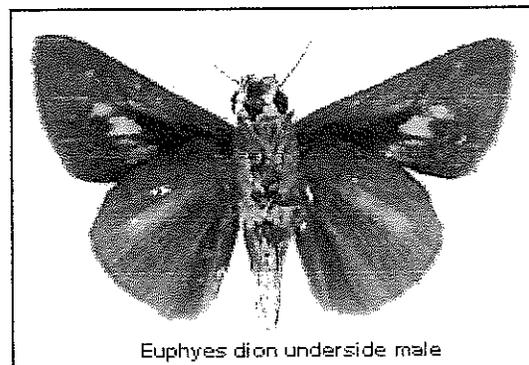
Adult food: Nectar from flowers of pickerelweed, sneezeweed, buttonbush, Alsike clover, and others.

Habitat: Swamps, open marshes, and bogs.

Range: Scattered populations along the Atlantic coast from western Massachusetts and southeastern New York south to northeastern Florida, west to northeast Texas, and north to southeastern North Dakota, northern Wisconsin, southern Ontario, and southern Quebec.



Euphyes dion female



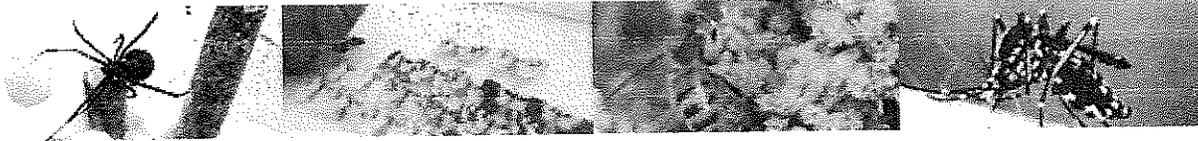
Euphyes dion underside male

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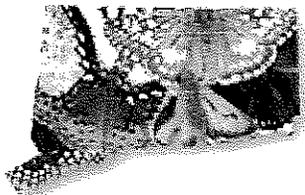
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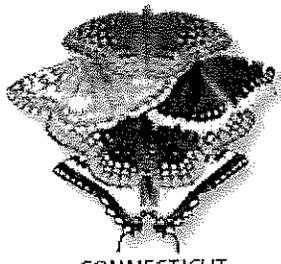
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Entomology

The Connecticut Butterfly Atlas Project Connecticut's Endangered and Threatened Species

The Yale Peabody Museum's Division of Entomology is host to the website of the Connecticut Butterfly Atlas Project.

No laws cover collecting butterflies or other insects on private land. Collecting on State of Connecticut property, however, requires special permission. In addition, butterflies on the list of Connecticut's Endangered, Threatened and Special Concern Species (State of Connecticut Department of Environmental Protection 1998) are protected by Public Act 89-224, The Connecticut Endangered Species Act.

The protected butterflies are:

- Amblyscirtes vialis* — Roadside Skipper — Status = SC
- Calephalis borealis* — Northern Metalmark — Status = E
- Celastrina neglectamajor* — Appalachian Azure — Status = T
- Erynnis brizo* — Sleepy Duskywing — Status = T
- Erynnis horatius* — Harace's Duskywing — Status = SC
- Erynnis lucilius* — Columbine Duskywing — Status = E
- Erynnis martialis* — Mottled Duskywing — Status = SC(ex)
- Erynnis persius* — Persius Duskywing — Status = E
- Euphyes bimacula* — Two-spotted Skipper — Status = T
- Euphyes dion* — Sedge Skipper — Status = T
- Callophrys henrici* — Henry's Elfin — Status = SC
- Callophrys irus* — Frosted Elfin — Status = T
- Callophrys polia* — Hoary Elfin — Status = SC(ex)
- Lycaena epixanthe* — Bog Copper — Status = SC
- Lycaena hyllus* — Bronze Copper — Status = SC
- Callophrys hesseli* — Hessel's Hairstreak — Status = E
- Polygonia progne* — Gray Comma — Status = SC(ex)
- Satyroides eurydice* — Eyed Brown — Status = SC
- Speyeria idalia* — Regal Fritillary — Status = SC(ex)

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Species are categorized as:

E = Endangered, means any native species documented by biological research and inventory to be in danger of extirpation throughout all or a significant portion of its range within the state and to have no more than five occurrences in the state, and any species determined to be an "endangered species" pursuant to the Federal Endangered Species Act.

T = Threatened, means any native species documented by biological research and inventory to be likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range within the

state and to have no more than nine occurrences in the state, and any species determined to be a "threatened species" pursuant to the Federal Endangered Species Act, except for such species determined to be endangered by the Commissioner in accordance with section 4 of this act.

SC = Special Concern, means any native plant species or nonharvested wildlife species documented by scientific research and inventory to have a naturally restricted range or habitat in the state, to be at a low population level, to be in such high demand by man that unregulated taking would be detrimental to the conservation of its population or has been extirpated from the state.

SC(ex) = Special Concern, Extirpated from Connecticut.

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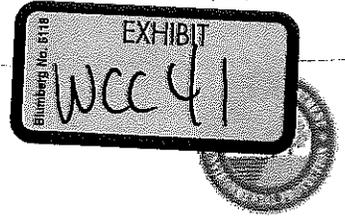
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Jefferson Salamander Complex

(Ambystoma jeffersonianum complex)



IDENTIFICATION: Slender, wide head, long toes, brown coloration with silvery foxing on the sides of the body and legs. Tail flattened laterally. Medium to large size, adults 130-170 mm total length.

This salamander occurs west of the Connecticut River where it is localized in the upland areas of Litchfield County and northern Fairfield County. A second center of distribution is along the trap rock ridge system of the Central Connecticut Lowland. This salamander is very sensitive to habitat disturbance and fragmentation, and is undergoing a range-wide decline (Bogart and Klemens, 1997). It breeds in vernal pools and requires extensive tracts of forest surrounding these pools to survive. In Connecticut, the most vulnerable populations are those associated with the trap rock ridge system, with at least one well known population at Foxon, near New Haven, now extinct. Populations in Fairfield, New Haven, and Hartford Counties have also been severely reduced and stressed by habitat fragmentation.

[Salamanders](#) | [Amphibians and Reptiles in Connecticut](#)



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Spotted Salamander

(Ambystoma maculatum)



IDENTIFICATION: Robust, broad head, gray coloration with bright yellow spots on back and tail. Large, adults 120-200 mm total length, females considerably larger than males.

This is Connecticut's most widespread mole salamander, reported from all the state's ecoregions. It is, however, undergoing a long-term decline within the state not only because of the loss of its vernal pool breeding habitats, but of even more importance, the reduction of upland habitat surrounding its aquatic breeding sites, as well as road mortality. Most wetland regulations proscribe a 50-100 foot wide forested buffer around vernal pools. This buffer is to maintain water quality. To maintain the amphibian biodiversity of a vernal pool requires 500 feet or more of primarily forested habitat surrounding salamander breeding pools. Section 26-55-3-A of the Connecticut Code protects spotted salamanders by limiting possession to no more than three adults at any time. Section 26-66-13-B prohibits collection of eggs and juveniles, sets an open season from May 1 to August 31, sets a daily and seasonal bag limit to three animals, and limits collection to hand or handheld implements, with seining specifically prohibited. Spotted salamanders are declining in urbanized and fragmented habitats throughout the northeastern United States.

[Salamanders](#) | [Amphibians and Reptiles in Connecticut](#)



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Green Frog

(Rana clamitans melanota)



IDENTIFICATION: Often mistaken for the bullfrog, this species is smaller, its dorsum tends to be browner or mottled, its belly more darkly mottled, and a pair of longitudinal creases (dorsolateral folds) run from the back of the eye to the groin. Adults 50-100 mm body length.

Green frogs are widely distributed statewide. Unlike the bull frog, they are able to exploit a wide variety of wetland habitats, including permanent and semipermanent water bodies, wooded swamps and vernal pools, as well as small streams. The green frog is presently secure in Connecticut.

[Frogs | Amphibians and Reptiles in Connecticut](#)

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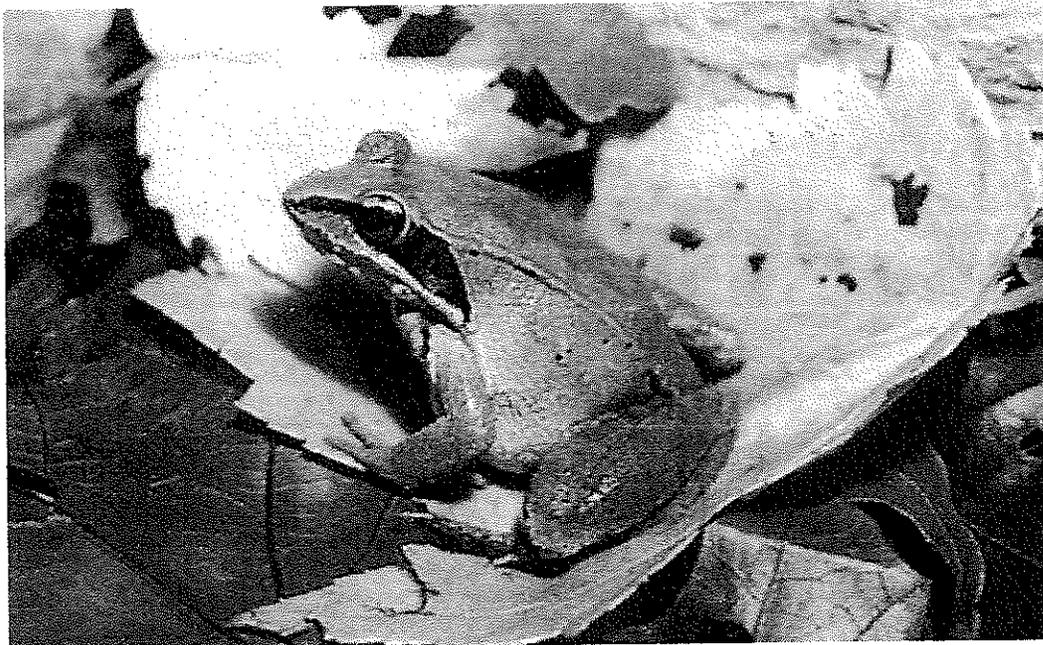
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Wood Frog

(Rana sylvatica)



IDENTIFICATION: A medium-size, rich brown to fawn colored frog with a dark black mask around eyes, and a well-defined pair of dorsolateral folds. Small wood frogs may be confused with spring peepers; however, peepers have small terminal suction cups on their toes. Females larger than males, adults 40-60 mm body length.

The wood frog is a vernal pool-dependent amphibian found statewide, but undergoing a long-term, non-cyclical decline. The primary cause of this decline is the loss of upland habitat that surrounds their woodland pool breeding sites. Research by Klemens (1998a) near Danbury reported that wood frogs were in serious decline in habitat blocks of under 1,000 acres that were fragmented by roads and development.

[Frogs](#) | [Amphibians and Reptiles in Connecticut](#)

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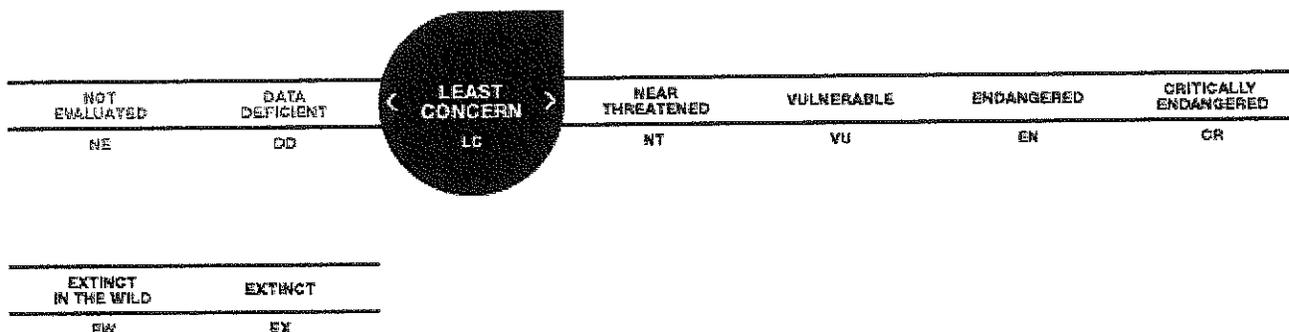
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Ambystoma opacum



- [Summary](#)
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- [Bibliography](#)
- [Full Account](#)

- [Taxonomy](#)
- [Assessment Information](#)
- [Geographic Range](#)
- [Population](#)
- [Habitat and Ecology](#)
- [Threats](#)
- [Conservation Actions](#)

Taxonomy [top]

| | | | | |
|----------------|---------------|--------------|--------------|----------------|
| Kingdom | Phylum | Class | Order | Family |
| ANIMALIA | CHORDATA | AMPHIBIA | CAUDATA | AMBYSTOMATIDAE |

Scientific Name: *Ambystoma opacum*

Species Authority: (Gravenhorst, 1807)

Common Name/s:

English – Marbled Salamander

Assessment Information [[top](#)]

Red List Category & Criteria: Least Concern [ver 3.1](#)

Year Assessed: 2004

Assessor/s: Geoffrey Hammerson

Evaluator/s: Stuart, S.N., Chanson, J.S., Cox, N.A. & Young, B.E. (Global Amphibian Assessment Coordinating Team)

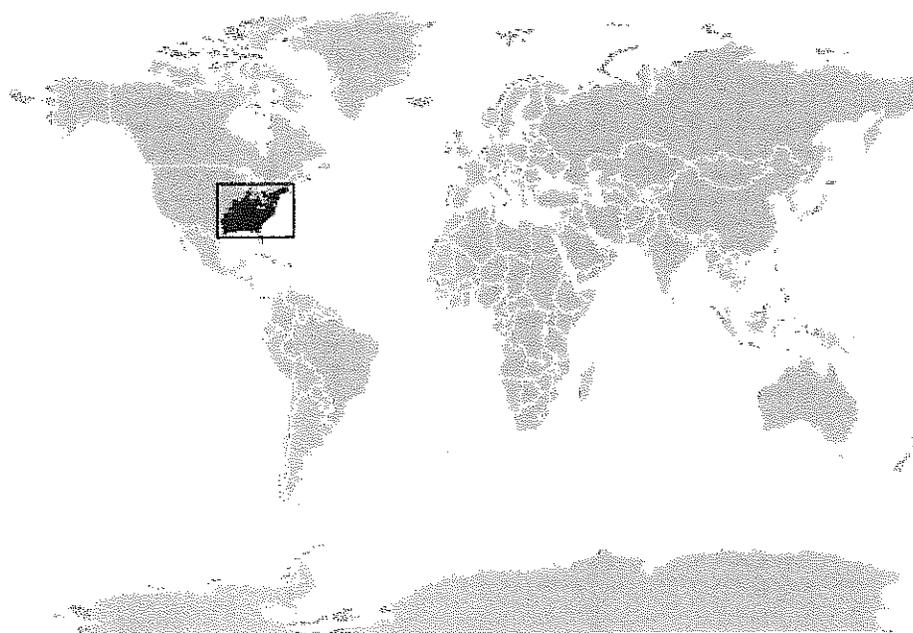
Justification:

Listed as Least Concern in view of its wide distribution, presumed large population, and because it is unlikely to be declining fast enough to qualify for listing in a more threatened category.

Geographic Range [[top](#)]

Range Description: This species occurs in the eastern USA from New Hampshire southward to northern Florida, west through southeastern New York to Lake Michigan region, south to eastern Oklahoma and eastern Texas. It is absent from most of the Appalachian Mountains.

Countries: Native:
United States
([click map to view full version](#))



Range Map:

Population [\[top\]](#)

- Population:** Total adult population size is unknown but probably exceeds 100,000. Overall, its populations are stable, though there are some local declines due to habitat loss.
- Population Trend:** → Stable

Habitat and Ecology [\[top\]](#)

- Habitat and Ecology:** It can be found in various wooded habitats, vicinity of swamps and vernal pools. More tolerant of dry habitats than are most salamanders; can be found on rocky bluffs and slopes and wooded sand dunes. Adults are entirely terrestrial and are usually found under surface objects or underground. Eggs are laid in forest depressions such as vernal pool basins and sometimes at the edges of permanent ponds, swamps, and slow-moving streams; in areas likely to be flooded by fall rain. Oviposition sites typically are in bare mineral soil beneath protective cover of leaf-litter, log, detritus, or rock.
- Systems:** Terrestrial; Freshwater

Threats [\[top\]](#)

- Major Threat(s):** Threats to local populations likely include intensive timber harvesting practices that reduce canopy closure, understorey vegetation, uncompacted forest litter, or coarse woody debris (moderately to well-decayed) in areas surrounding breeding sites (deMaynadier and Hunter 1999). Breeding sites are vulnerable to destruction and degradation through draining and filling, and many are being isolated by habitat fragmentation, which could eventually result in deleterious levels of inbreeding and reduced chances of re-establishment of locally extirpated populations. Thousands of local populations already have been eliminated by habitat loss, and more will be lost in the future (Petranka 1998). This species is sometimes found in the international pet trade but at levels that do not currently constitute a major threat.

Conservation Actions [\[top\]](#)

- Conservation Actions:** Needed conservation measures include protection of vernal pools and adjacent wooded areas up to at least 200-250m from the pools. Also, regulatory agencies should attempt to minimize forest fragmentation.
- Citation:** Geoffrey Hammerson 2004. *Ambystoma opacum*. In: IUCN 2008. 2008 IUCN Red List of Threatened Species. <www.iucnredlist.org>. Downloaded on 04 May 2009.

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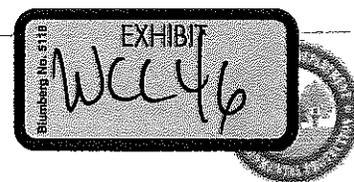
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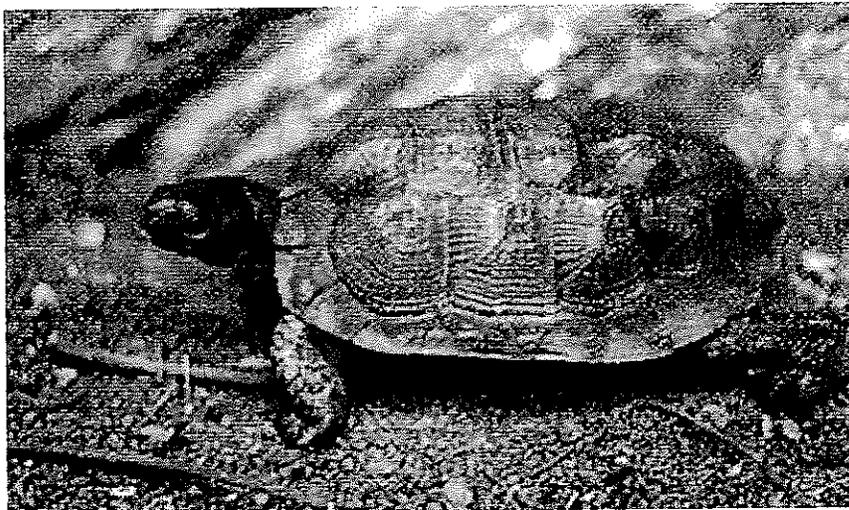
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Wood Turtle

(*Clemmys insculpta*)



IDENTIFICATION: A medium-sized turtle, readily distinguished by its sculptured, rough, moderately-domed carapace, black head, orange-red wash on its under limbs, and a yellow plastron with black squares along the edges. Adults 150-200 mm carapace length.

In contrast to Connecticut's other turtle species, the wood turtle is an animal of the northern forest biome, from the Great Lakes eastward through New England and northeastern Canada. Its southern range limit lies near Washington, DC. In Connecticut, the strongholds of wood turtle distribution are the eastern and western uplands. Although once quite common in the Central Connecticut Lowland, many populations have been reduced or even eliminated by habitat fragmentation. This species was never common in the coastal zone of the state. Wood turtles have extensive landscape-scale habitat requirements, requiring clean rivers and large streams with deeply undercut banks for hibernation, as well as extensive areas of floodplain, forest, and fields for summer foraging. Because of their extensive overland movements, they are very susceptible to road mortality. They take over a decade to reach sexual maturity, and have a low egg output, and limited juvenile survivorship. Loss of adults from breeding populations, whether from increased road mortality or by collection for the wildlife trade, is a major problem affecting the sustainability of wood turtle populations in Connecticut. Possession of any wood turtle is prohibited (Conn. Code Sec. 26-55-3-C) in Connecticut without regard to its origin, and collection within Connecticut is prohibited (Conn. Code Sec. 26-66-14-A). The wood turtle is a "Special Concern" species in Connecticut. International commerce in wood turtles posed such a threat that in 1992 this species was placed under international trade regulatory protection administered by CITES (Convention on International Trade in Endangered Species of Flora and Fauna). The wood turtle

is of conservation concern throughout most of its range. Most states and provinces where it occurs afford it special status and/or some form of statutory protection.

[Turtles | Amphibians and Reptiles in Connecticut](#)

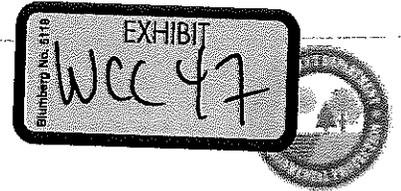
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(Rana pipiens)



IDENTIFICATION: A medium-size frog often confused with the pickerel frog from which it is distinguished by a dorsal pattern of dark circles with white edges irregularly distributed over a green or brown dorsum. The belly, thighs, and groin are white. When disturbed it tends to flee in a series of zigzag jumps into high grass. Adults 50-70 mm body length.

This species is restricted to seasonal wet meadows and forests located on the floodplain of a river or large stream. Leopard frogs are locally common along sections of the Connecticut River and its tributaries, the Farmington, Scantic, and Coginchaug Rivers. Populations are scattered in Litchfield County and at a few other sites west of the Connecticut River. This species is often confused with the widespread pickerel frog. Leopard frogs in Connecticut represent two distinct gene pools. Klemens (1993) reporting on biochemical and morphological studies conducted on Connecticut leopard frogs found that animals from the Connecticut River drainage are referable to the northern leopard frog. Those from the Housatonic drainage of western Connecticut have some of the distinctive genetic and morphological markers of the southern leopard frog, *Rana sphenoccephala utricularius*. One major distinction is that the males of the Connecticut River population possess vestigial oviducts, a characteristic of the northern leopard frog, while males from the Housatonic drainage lack vestigial oviducts. These data point to two separate origins of Connecticut's leopard frog population.

Leopard frogs have disappeared from some areas of Connecticut; historical data and reports indicate that they were once more widespread. They are intolerant of acidic conditions, which may account for their present distribution in the state



*A County Report of
Connecticut's Endangered, Threatened and Special Concern Species*

Litchfield County

Amphibians

| Scientific Name | Common Name | Protection Status |
|-----------------------------------|----------------------------|-------------------|
| <i>Ambystoma jeffersonianum</i> | Jefferson Salamander | SC |
| <i>Ambystoma laterale</i> | Blue-spotted Salamander | T |
| <i>Gyrinophilus porphyriticus</i> | Northern Spring Salamander | T |
| <i>Rana pipiens</i> | Northern Leopard Frog | SC |

Birds

| Scientific Name | Common Name | Protection Status |
|------------------------------|-----------------------|-------------------|
| <i>Accipiter striatus</i> | Sharp-shinned Hawk | E |
| <i>Aegolius acadicus</i> | Northern Saw-whet Owl | SC |
| <i>Ammodramus henslowii</i> | Henslow's Sparrow | SC* |
| <i>Ammodramus savannarum</i> | Grasshopper Sparrow | E |
| <i>Anas discors</i> | Blue-winged Teal | T |
| <i>Asio otus</i> | Long-eared Owl | E |
| <i>Bartramia longicauda</i> | Upland Sandpiper | E |
| <i>Botaurus lentiginosus</i> | American Bittern | E |
| <i>Caprimulgus vociferus</i> | Whip-poor-will | SC |
| <i>Circus cyaneus</i> | Northern Harrier | E |
| <i>Cistothorus platensis</i> | Sedge Wren | E |
| <i>Corvus corax</i> | Common Raven | SC |
| <i>Dolichonyx oryzivorus</i> | Bobolink | SC |
| <i>Empidonax alnorum</i> | Alder Flycatcher | SC |
| <i>Eremophila alpestris</i> | Horned Lark | E |
| <i>Falco sparverius</i> | American Kestrel | T |
| <i>Gallinula chloropus</i> | Common Moorhen | E |
| <i>Gavia immer</i> | Common Loon | SC |

Litchfield County

Birds

| Scientific Name | Common Name | Protection Status |
|-----------------------------------|-----------------------|-------------------|
| <i>Haliaeetus leucocephalus</i> | Bald Eagle | E |
| <i>Ixobrychus exilis</i> | Least Bittern | T |
| <i>Melanerpes erythrocephalus</i> | Red-headed Woodpecker | E |
| <i>Parula americana</i> | Northern Parula | SC |
| <i>Passerculus sandwichensis</i> | Savannah Sparrow | SC |
| <i>Podilymbus podiceps</i> | Pied-billed Grebe | E |
| <i>Pooecetes gramineus</i> | Vesper Sparrow | E |
| <i>Progne subis</i> | Purple Martin | T |
| <i>Sturnella magna</i> | Eastern Meadowlark | SC |
| <i>Tyto alba</i> | Barn Owl | E |
| <i>Vermivora chrysoptera</i> | Golden-winged Warbler | E |

Fish

| Scientific Name | Common Name | Protection Status |
|------------------------------|-----------------|-------------------|
| <i>Catostomus catostomus</i> | Longnose Sucker | SC |
| <i>Lota lota</i> | Burbot | E |

Invertebrates

| Scientific Name | Common Name | Protection Status |
|-----------------------------------|-------------------------|-------------------|
| <i>Acrionicta albarufa</i> | Barrens Dagger Moth | SC* |
| <i>Agonum darlingtoni</i> | A Ground Beetle | SC |
| <i>Agrotis stigmata</i> | Spotted Dart Moth | SC* |
| <i>Amblyscirtes vialis</i> | Common Roadside Skipper | T |
| <i>Anarta luteola</i> | Yellow Anarta | E |
| <i>Anthopotamus verticis</i> | Tusked Sprawler | SC |
| <i>Apamea burgessi</i> | A Noctuid Moth | SC |
| <i>Apodrepanulatrix liberaria</i> | New Jersey Tea Inchworm | SC |
| <i>Atylotus ohioensis</i> | Tabanid Fly | SC |
| <i>Bembidion quadratum</i> | A Ground Beetle | SC |

Litchfield County

Invertebrates

| Scientific Name | Common Name | Protection Status |
|-------------------------------------|-----------------------------------|-------------------|
| <i>Bembidion simplex</i> | A Ground Beetle | SC |
| <i>Calephelis borealis</i> | Northern Metalmark | E |
| <i>Callophrys irus</i> | Frosted Elfin | T |
| <i>Catocala herodias gerhardi</i> | Herodias Underwing | T |
| <i>Chaetagnaea cerata</i> | A Noctuid Moth | SC* |
| <i>Cicindela tranquebarica</i> | Dark Bellied Tiger Beetle | SC |
| <i>Cinygmula subaequalis</i> | A Mayfly | SC |
| <i>Citheronia regalis</i> | Regal Moth | SC* |
| <i>Eacles imperialis imperialis</i> | Imperial Moth | SC* |
| <i>Erynnis lucilius</i> | Columbine Duskywing | E |
| <i>Erynnis persius persius</i> | Persius Duskywing | E |
| <i>Euphyes bimacula</i> | Two-spotted Skipper | T |
| <i>Euphyes dion</i> | Sedge Skipper | T |
| <i>Exyra rolandiana</i> | Pitcher Plant Moth | SC |
| <i>Fossaria galbana</i> | Lymnaeid snail | SC* |
| <i>Gomphus adelphus</i> | Mustached Clubtail | T |
| <i>Gomphus descriptus</i> | Harpoon Clubtail | T |
| <i>Gomphus ventricosus</i> | Skillet Clubtail | SC |
| <i>Grammia speciosa</i> | Bog Tiger Moth | E |
| <i>Hemaris gracilis</i> | Slender Clearwing | T |
| <i>Hetaerina americana</i> | American Rubyspot | SC |
| <i>Hybomitra frosti</i> | A Horse Fly | T |
| <i>Hybomitra longiglossa</i> | A Horse Fly | E |
| <i>Hybomitra lurida</i> | A Horse Fly | SC |
| <i>Hybomitra typhus</i> | A Horse Fly | SC |
| <i>Hydraecia immanis</i> | Hop Vine Borer Moth | SC* |
| <i>Itame sp. 1 nr. inextricata</i> | Barrens Itame (cf I. inextricata) | T |
| <i>Leucorrhinia glacialis</i> | Crimson-ringed Whiteface | T |

Litchfield County

Invertebrates

| Scientific Name | Common Name | Protection Status |
|------------------------------------|----------------------------------|--------------------------|
| <i>Ligumia nasuta</i> | Eastern Pondmussel | SC |
| <i>Lycaena epixanthe</i> | Bog Copper | SC |
| <i>Lycaena hyllus</i> | Bronze Copper | SC |
| <i>Margaritifera margaritifera</i> | Eastern Pearlshell | SC |
| <i>Meropleon ambifuscum</i> | Newman's Brocade | SC* |
| <i>Merycomyia whitneyi</i> | Tabanid Fly | SC |
| <i>Metarranthis apiciaria</i> | Barrens Metarranthis Moth | SC* |
| <i>Papaipema appassionata</i> | Pitcher Plant Borer Moth | E |
| <i>Papaipema circumlucens</i> | Hops Stalk Borer Moth | SC* |
| <i>Papaipema leucostigma</i> | Columbine Borer | SC |
| <i>Papaipema sciata</i> | Culvers Root Borer | SC* |
| <i>Phyllonorycter ledella</i> | Labrador Tea Tentiform Leafminer | E |
| <i>Psectraglaea carnosa</i> | Pink Sallow | T |
| <i>Sargus fasciatus</i> | Soldier Fly | SC |
| <i>Satyroides eurydice</i> | Eyed Brown | SC |
| <i>Somatochlora elongata</i> | Ski-tailed Emerald | SC |
| <i>Speyeria atlantis</i> | Atlantis Fritillary | SC |
| <i>Tabanus fulvicallus</i> | Horse Fly | SC |
| <i>Valvata tricarinata</i> | Threeridge Valvata | SC |

Mammals

| Scientific Name | Common Name | Protection Status |
|---------------------------|----------------------|--------------------------|
| <i>Lasiurus cinereus</i> | Hoary Bat | SC |
| <i>Synaptomys cooperi</i> | Southern Bog Lemming | SC |

Plants

| Scientific Name | Common Name | Protection Status |
|---------------------------|---------------------|--------------------------|
| <i>Abies balsamea</i> | Balsam Fir | E |
| <i>Acalypha virginica</i> | Virginia Copperleaf | SC |

Litchfield County

Plants

| Scientific Name | Common Name | Protection Status |
|---|---------------------|--------------------------|
| <i>Acer nigrum</i> | Black Maple | SC |
| <i>Agastache scrophulariifolia</i> | Purple Giant Hyssop | E |
| <i>Alopecurus aequalis</i> | Orange Foxtail | T |
| <i>Amelanchier sanguinea</i> | Roundleaf Shadbush | E |
| <i>Andromeda glaucophylla</i> | Bog Rosemary | T |
| <i>Anemone canadensis</i> | Canada Anemone | E |
| <i>Angelica venenosa</i> | Hairy Angelica | SC* |
| <i>Antennaria neglecta var. petaloidea</i> | Field Pussytoes | SC* |
| <i>Aplectrum hyemale</i> | Puttyroot | SC* |
| <i>Arceuthobium pusillum</i> | Dwarf Mistletoe | E |
| <i>Arethusa bulbosa</i> | Arethusa | SC* |
| <i>Aristida longespica</i> | Needlegrass | SC |
| <i>Aristolochia serpentaria</i> | Virginia Snakeroot | SC |
| <i>Asclepias viridiflora</i> | Green Milkweed | E |
| <i>Asplenium montanum</i> | Mountain Spleenwort | T |
| <i>Asplenium ruta-muraria</i> | Wallrue Spleenwort | T |
| <i>Betula pumila</i> | Swamp Birch | SC |
| <i>Blephilia ciliata</i> | Downy Woodmint | SC* |
| <i>Blephilia hirsuta</i> | Hairy Woodmint | SC* |
| <i>Bouteloua curtipendula</i> | Side-oats Grama | E |
| <i>Calamagrostis stricta ssp. inexpansa</i> | Reed Bentgrass | SC |
| <i>Calystegia spithamea</i> | Low Bindweed | SC* |
| <i>Cardamine douglassii</i> | Purple Cress | SC |
| <i>Carex aestivalis</i> | Summer Sedge | SC |
| <i>Carex alata</i> | Broadwing Sedge | E |
| <i>Carex alopecoidea</i> | Foxtail Sedge | T |
| <i>Carex aquatilis var. altior</i> | Sedge | SC |
| <i>Carex backii</i> | Sedge | E |

Litchfield County

Plants

| Scientific Name | Common Name | Protection Status |
|----------------------------|-------------------------|-------------------|
| <i>Carex bushii</i> | Sedge | SC |
| <i>Carex buxbaumii</i> | Brown Bog Sedge | E |
| <i>Carex castanea</i> | Chestnut-colored Sedge | E |
| <i>Carex crawei</i> | Crawe's Sedge | T |
| <i>Carex crawfordii</i> | Crawford Sedge | SC* |
| <i>Carex cumulata</i> | Clustered Sedge | T |
| <i>Carex davisii</i> | Davis' Sedge | E |
| <i>Carex foenea</i> | Bronze Sedge | SC* |
| <i>Carex formosa</i> | Handsome Sedge | SC |
| <i>Carex hitchcockiana</i> | Hitchcock's Sedge | SC |
| <i>Carex limosa</i> | Sedge | E |
| <i>Carex lupuliformis</i> | False Hop Sedge | SC |
| <i>Carex molesta</i> | Troublesome Sedge | SC |
| <i>Carex novae-angliae</i> | New England Sedge | SC |
| <i>Carex oligocarpa</i> | Eastern Few-fruit Sedge | SC |
| <i>Carex pauciflora</i> | Few-flowered Sedge | SC* |
| <i>Carex paupercula</i> | Sedge | E |
| <i>Carex prairiea</i> | Prairie Sedge | SC |
| <i>Carex pseudocyperus</i> | Cyperus-like Sedge | E |
| <i>Carex schweinitzii</i> | Schweinitz's Sedge | E |
| <i>Carex squarrosa</i> | Sedge | SC |
| <i>Carex sterilis</i> | Dioecious Sedge | SC |
| <i>Carex trichocarpa</i> | Sedge | SC |
| <i>Carex tuckermanii</i> | Tuckerman Sedge | SC |
| <i>Carex viridula</i> | Little Green Sedge | E |
| <i>Castilleja coccinea</i> | Indian Paintbrush | E |
| <i>Chamaelirium luteum</i> | Devil's-bit | E |

Litchfield County

Plants

| Scientific Name | Common Name | Protection Status |
|--|--------------------------------|-------------------|
| <i>Coeloglossum viride</i> var. <i>virescens</i> | Long-bracted Green Orchid | SC |
| <i>Corallorhiza trifida</i> | Early Coralroot | SC |
| <i>Cryptogramma stelleri</i> | Slender Cliff-brake | E |
| <i>Cuphea viscosissima</i> | Blue Waxweed | SC* |
| <i>Cypripedium parviflorum</i> | Yellow Lady's-slipper | SC |
| <i>Cypripedium reginae</i> | Showy Lady's-slipper | E |
| <i>Dalibarda repens</i> | Dew-drop | E |
| <i>Desmodium glabellum</i> | Dillen Tick-trefoil | SC |
| <i>Desmodium humifusum</i> | Trailing Tick-trefoil | SC |
| <i>Dicentra canadensis</i> | Squirrel-corn | T |
| <i>Diplazium pycnocarpon</i> | Narrow-leaved Glade Fern | E |
| <i>Draba reptans</i> | Whitlow-grass | SC |
| <i>Dryopteris campyloptera</i> | Mountain Wood-fern | E |
| <i>Dryopteris goldiana</i> | Goldie's Fern | SC |
| <i>Eleocharis equisetoides</i> | Horse-tail Spikerush | E |
| <i>Elymus trachycaulus</i> ssp. <i>subsecundus</i> | Slender Wheatgrass | SC |
| <i>Elymus wiegandii</i> | Wiegand's Wild Rice | SC |
| <i>Equisetum pratense</i> | Meadow Horsetail | E |
| <i>Equisetum scirpoides</i> | Dwarf Scouring Rush | E |
| <i>Eriophorum vaginatum</i> var. <i>spissum</i> | Hare's Tail | T |
| <i>Galium labradoricum</i> | Bog Bedstraw | E |
| <i>Gaultheria hispidula</i> | Creeping Snowberry | T |
| <i>Gaylussacia dumosa</i> var. <i>bigeloviana</i> | Dwarf Huckleberry | T |
| <i>Gentiana quinquefolia</i> | Stiff Gentian | E |
| <i>Geranium bicknellii</i> | Bicknell Northern Crane's-bill | SC* |
| <i>Helianthemum propinquum</i> | Low Frostweed | T |
| <i>Hemicarpha micrantha</i> | Dwarf Bulrush | E |
| <i>Hepatica acutiloba</i> | Sharp-lobed Hepatica | SC |

Litchfield County

Plants

| Scientific Name | Common Name | Protection Status |
|---|----------------------------|--------------------------|
| <i>Houstonia longifolia</i> | Longleaf Bluet | E |
| <i>Hydrocotyle umbellata</i> | Water Pennywort | E |
| <i>Hydrophyllum virginianum</i> | Virginia Waterleaf | SC |
| <i>Hypericum pyramidatum</i> | Great St. John's-wort | SC |
| <i>Isanthus brachiatus</i> | False Pennyroyal | E |
| <i>Isotria medeoloides</i> | Small Whorled Pogonia | E |
| <i>Krigia biflora</i> | Two-flowered Cynthia | SC |
| <i>Ledum groenlandicum</i> | Labrador Tea | T |
| <i>Liatris scariosa</i> var. <i>novae-angliae</i> | Blazing-star | SC |
| <i>Linnaea borealis</i> var. <i>americana</i> | Twinflower | E |
| <i>Linum sulcatum</i> | Yellow Flax | SC |
| <i>Lygodium palmatum</i> | Climbing Fern | SC |
| <i>Lythrum alatum</i> | Winged-loosestrife | E |
| <i>Malaxis monophyllos</i> | White Adder's-mouth | E |
| <i>Malaxis unifolia</i> | Green Adder's-mouth | E |
| <i>Megalodonta beekii</i> | Water-marigold | T |
| <i>Milium effusum</i> | Tall Millet-grass | SC* |
| <i>Mimulus alatus</i> | Winged Monkey-flower | SC |
| <i>Mitella nuda</i> | Naked Miterwort | SC |
| <i>Moneses uniflora</i> | One-flower Wintergreen | E |
| <i>Myriophyllum alterniflorum</i> | Slender Water-milfoil | E |
| <i>Myriophyllum sibiricum</i> | Northern Water-milfoil | T |
| <i>Nuphar microphylla</i> | Small Yellow Pond Lily | SC |
| <i>Nymphaea odorata</i> var. <i>tuberosa</i> | Water Lily | SC* |
| <i>Onosmodium virginianum</i> | Gravel-weed | E |
| <i>Ophioglossum pusillum</i> | Adder's Tongue | T |
| <i>Oryzopsis pungens</i> | Slender Mountain-ricegrass | SC |

Litchfield County

Plants

| Scientific Name | Common Name | Protection Status |
|---|--------------------------|--------------------------|
| <i>Oxalis violacea</i> | Violet Wood-sorrel | SC |
| <i>Panax quinquefolius</i> | American Ginseng | SC |
| <i>Panicum xanthophyllum</i> | Panic Grass | SC* |
| <i>Pellaea glabella</i> | Smooth Cliff-brake | E |
| <i>Petasites frigidus var. palmatus</i> | Sweet Coltsfoot | T |
| <i>Pinus resinosa</i> | Red Pine | E |
| <i>Plantago virginica</i> | Hoary Plantain | SC |
| <i>Platanthera blephariglottis</i> | White-fringe Orchid | E |
| <i>Platanthera dilatata</i> | Tall White Bog Orchid | SC* |
| <i>Platanthera flava</i> | Pale Green Orchid | SC |
| <i>Platanthera hookeri</i> | Hooker Orchid | SC* |
| <i>Platanthera orbiculata</i> | Large Roundleaf Orchid | SC* |
| <i>Podostemum ceratophyllum</i> | Threadfoot | SC |
| <i>Polanisia dodecandra</i> | Clammy-weed | SC* |
| <i>Polygala senega</i> | Seneca Snakeroot | E |
| <i>Populus heterophylla</i> | Swamp Cottonwood | E |
| <i>Potamogeton confervoides</i> | Pondweed | SC* |
| <i>Potamogeton friesii</i> | Fries' Pondweed | E |
| <i>Potamogeton hillii</i> | Hill's Pondweed | E |
| <i>Potamogeton ogdenii</i> | Ogden's Pondweed | E |
| <i>Potamogeton strictifolius</i> | Straight-leaf Pondweed | E |
| <i>Potamogeton vaseyi</i> | Vasey's Pondweed | E |
| <i>Potentilla arguta</i> | Tall Cinquefoil | SC |
| <i>Potentilla tridentata</i> | Three-toothed Cinquefoil | E |
| <i>Pycnanthemum clinopodioides</i> | Basil Mountain-mint | E |
| <i>Pyrola secunda</i> | One-sided Pyrola | SC* |
| <i>Quercus macrocarpa</i> | Bur Oak | SC |
| <i>Ranunculus ambiguus</i> | Water-plantain Spearwort | E |

Litchfield County

Plants

| Scientific Name | Common Name | Protection Status |
|--|-----------------------------------|--------------------------|
| <i>Ranunculus pensylvanicus</i> | Bristly Buttercup | SC* |
| <i>Ranunculus sceleratus</i> | Cursed Crowfoot | SC |
| <i>Ranunculus subrigidus</i> | White Water-crowfoot | SC |
| <i>Rhynchospora capillacea</i> | Capillary Beakrush | E |
| <i>Rhynchospora macrostachya</i> | Beaked Rush | T |
| <i>Ribes glandulosum</i> | Skunk Currant | T |
| <i>Ribes rotundifolium</i> | Wild Currant | SC* |
| <i>Ribes triste</i> | Swamp Red Currant | E |
| <i>Rubus cuneifolius</i> | Sand Bramble | SC |
| <i>Salix pedicellaris</i> | Bog Willow | E |
| <i>Salix serissima</i> | Autumn Willow | SC |
| <i>Scheuchzeria palustris</i> | Pod Grass | E |
| <i>Schizachne purpurascens</i> | Purple Oat | SC |
| <i>Scirpus acutus</i> | Hard-stemmed Bulrush | T |
| <i>Scirpus hudsonianus</i> | Cotton Bulrush | SC* |
| <i>Scirpus torreyi</i> | Torrey's Bulrush | T |
| <i>Scleria verticillata</i> | Low Nutrush | SC* |
| <i>Scutellaria leonardii</i> | Small Skullcap | E |
| <i>Senecio pauperculus</i> | Ragwort | E |
| <i>Senna hebecarpa</i> | Wild Senna | SC |
| <i>Silene stellata</i> | Starry Champion | SC |
| <i>Smilacina trifolia</i> | Three-leaved False Solomon's-seal | T |
| <i>Solidago ptarmicoides</i> | Prairie Goldenrod | E |
| <i>Solidago rigida</i> | Stiff Goldenrod | E |
| <i>Solidago rugosa var. sphagnophila</i> | Early Wrinkle-leaved Goldenrod | SC* |
| <i>Sparganium fluctuans</i> | Floating Bur-reed | E |
| <i>Sparganium minimum</i> | Small Bur-reed | SC* |

Litchfield County

Plants

| Scientific Name | Common Name | Protection Status |
|---|----------------------------|-------------------|
| <i>Sporobolus cryptandrus</i> | Sand Dropseed | T |
| <i>Sporobolus neglectus</i> | Small Dropseed | E |
| <i>Stellaria borealis</i> | Northern Stitchwort | SC |
| <i>Streptopus amplexifolius var. americanus</i> | White Mandarin | T |
| <i>Taenidia integerrima</i> | Yellow Pimpernel | E |
| <i>Thuja occidentalis</i> | Northern White Cedar | T |
| <i>Trichomanes intricatum</i> | Appalachian Gametophyte | SC |
| <i>Triphora trianthophora</i> | Nodding Pogonia | SC* |
| <i>Trisetum spicatum var. molle</i> | Spiked False Oats | SC* |
| <i>Trollius laxus</i> | Spreading Globeflower | T |
| <i>Utricularia resupinata</i> | Bladderwort | E |
| <i>Uvularia grandiflora</i> | Large-flowered Bellwort | E |
| <i>Vaccinium myrtilloides</i> | Velvetleaf Blueberry | SC* |
| <i>Viola canadensis</i> | Canada Violet | SC |
| <i>Viola nephrophylla</i> | Northern Bog Violet | SC |
| <i>Viola renifolia var. brainerdii</i> | Kidney-leaf White Violet | SC |
| <i>Viola selkirkii</i> | Great-spurred Violet | SC |
| <i>Waldsteinia fragarioides</i> | Barren Strawberry | SC |
| <i>Xyris montana</i> | Northern Yellow-eyed grass | T |

Reptiles

| Scientific Name | Common Name | Protection Status |
|------------------------------|-----------------------|-------------------|
| <i>Clemmys insculpta</i> | Wood Turtle | SC |
| <i>Clemmys muhlenbergii</i> | Bog Turtle | E |
| <i>Crotalus horridus</i> | Timber Rattlesnake | E |
| <i>Eumeces fasciatus</i> | Five-lined Skink | T |
| <i>Heterodon platirhinos</i> | Eastern Hognose Snake | SC |
| <i>Terrapene carolina</i> | Eastern Box Turtle | SC |

Litchfield County

Reptiles

| Scientific Name | Common Name | Protection Status |
|----------------------------|----------------------|--------------------------|
| <i>Thamnophis sauritus</i> | Eastern Ribbon Snake | SC |

E = Endangered, T = Threatened, SC = Special Concern, * Believed Extirpated

*State of Connecticut
Department of Environmental Protection
Bureau of Natural Resources, Wildlife Division
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MIGRATORY BIRD TREATY LIST SYNOPSIS OF RABBIT HILL BIRDS
BY DIANE DUPUIS



Common Loon
American Bittern
Great Blue Heron
Canada Goose
Wood Duck
American Black Duck
Mallard
Hooded Merganser
Turkey Vulture
Osprey
Bald Eagle
Northern Harrier
Sharp Shinned Hawk
Cooper's Hawk
Northern Goshawk
Common Black-Hawk
Red-Shouldered Hawk
Broad Winged Hawk
Red-Tailed Hawk
Golden Eagle
Killdeer
American Woodcock
Mourning Dove
Eastern Screech Owl
Great Horned Owl
Barred Owl
Ruby-throated hummingbird
Belted Kingfisher
Red-bellied Woodpecker
Red-naped yellow bellied Sapsucker
Ladder-backed Woodpecker
Downy Woodpecker
Northern Flicker
Pileated Woodpecker
Eastern Phoebe
Purple Martin
Barn Swallow
Blue Jay
American Crow
Common Raven
Black Capped Chickadee
Tufted Titmouse
Red-Breasted Nuthatch

White-Breasted Nuthatch
Brown Creeper
Carolina Wren
House Wren
Golden Crowned Kinglet
Ruby Crowned Kinglet
Blue Gray Gnatcatcher
Eastern Bluebird
Veery
Hermit Thrush
Wood Thrush
American Robin
Gray Catbird
Brown Thrasher
Cedar Waxwing
Red Eyed Vireo
Tennessee Warbler
Yellow Warbler
Chestnut sided Warbler
Magnolia Warbler
Yellow Rumped Warbler
Yellow-throated Warbler
Bay-breasted Warbler
Black and white Warbler
American Redstart
Work-eating warbler
Oven bird
Mourning Warbler
Common Yellow throat
Painted Redstart
Yellow breasted Chat
Scarlet Tanager
Rose-breasted Grosbeak
Indigo bunting
Eastern Towhee
Chipping Sparrow
Field Sparrow
Vesper Sparrow
Lark Sparrow
Fox Sparrow
Song Sparrow
Swamp Sparrow
Dark-eyed junco
Red-winged Blackbird
Rusty Blackbird
Common Grackle

Brown Headed Cowbird
Orchard Oriole
Baltimore Oriole
Purple Finch
House Finch
Common Redpole
Pine Siskin
American Goldfinch
Evening Grosbeak

BIRDS PROTECTED BY THE MIGRATORY BIRD TREATY ACT

Species Protected by Each Migratory Bird Convention

The United States has entered into four international migratory bird conventions (with Canada, Mexico, Japan, and Russia). Each of these conventions provides protection to a select group of species. The Canadian convention identifies protected groups by Family or species group names (for example, Anatidae, Rallidae, loons, warblers, and so forth). The Mexican convention identifies protected groups by Family names. The Japanese and Russian conventions identify protected species in Appendices to the conventions.

The following list identifies those species protected by each of the conventions.

Column headings:

C = Canadian
 M = Mexican
 J = Japanese
 R = Russian

Symbols:

O = Family (or Subfamily) listed in convention (Canada and Mexico only)
 s = occurs regularly in both countries (Canada and Mexico only);
 + = occurs regularly in the U.S. but not Canada or Mexico (Canada and Mexico only);
 ? = status in U.S. is uncertain, and eligibility for continued protection is under review (Mexico only)
 X = listed in Appendix to convention (Japan and Russia only);
 o = belongs to same Family as species listed in Appendix to convention and occurs regularly in the U.S. (Russia only)

| <u>English Name</u> | <u>C</u> | <u>M</u> | <u>J</u> | <u>R</u> |
|------------------------|----------|----------|----------|----------|
| GAVIIDAE (Loons) | O | O | | |
| Red-throated Loon | s | s | X | X |
| Arctic Loon | s | + | X | X |
| Pacific (=Arctic) Loon | s | | | X |
| ✓ Common Loon | s | s | | O |
| Yellow-billed Loon | s | s | X | X |
| PODICIPEDIDAE (Grebes) | O | O | | |
| Least Grebe | + | s | | O |
| Pied-billed Grebe | s | s | | O |
| Horned Grebe | s | s | X | X |
| Red-necked Grebe | s | + | X | X |
| Eared Grebe | s | s | | O |

| | | | | |
|---|---|---|---|---|
| Western Grebe | s | s | | o |
| Clark's (=Western) Grebe | s | s | | o |
| | | | | |
| DIOMEDEIDAE (Albatrosses) | | O | | |
| Short-tailed Albatross | | s | X | X |
| Black-footed Albatross | | s | X | X |
| Laysan Albatross | | s | X | X |
| Yellow-nosed Albatross | | + | | o |
| | | | | |
| PROCELLARIIDAE (Shearwaters and Petrels) | O | O | | |
| Northern Fulmar | s | s | X | X |
| Black-capped Petrel | s | + | | o |
| Dark-rumped Petrel | + | s | | o |
| Juan Fernandez (=White-necked) Petrel | + | s | | o |
| White-necked Petrel | + | + | | o |
| Mottled Petrel | s | + | | X |
| Murphy's Petrel | + | + | | o |
| Kermadec Petrel | + | s | | o |
| Herald Petrel | + | s | | o |
| Cook's Petrel | + | s | | o |
| Bonin Petrel | + | + | X | X |
| Bulwer's Petrel | + | + | X | o |
| Cory's Shearwater | s | s | | o |
| Pink-footed Shearwater | s | s | | o |
| Flesh-footed Shearwater | s | s | X | X |
| Greater Shearwater | s | s | | o |
| Wedge-tailed Shearwater | + | s | X | o |
| Buller's Shearwater | s | s | | X |
| Sooty Shearwater | s | s | X | X |
| Short-tailed Shearwater | s | s | X | X |
| Christmas Shearwater | + | s | X | o |
| Manx Shearwater | s | + | | o |
| Black-vented Shearwater | s | s | | o |
| Townsend's Shearwater | + | s | | o |
| Little Shearwater | s | + | | o |
| Audubon's Shearwater | s | s | | o |
| | | | | |
| HYDROBATIDAE (Storm-Petrels) | O | O | | |
| Wilson's Storm-Petrel | s | + | X | o |
| White-faced Storm-Petrel | + | + | | o |
| Fork-tailed Storm-Petrel | s | + | X | X |
| Leach's Storm-Petrel | s | s | X | X |
| Ashy Storm-Petrel | + | s | | o |
| Band-rumped Storm-Petrel | s | s | X | X |
| Wedge-rumped Storm-Petrel | + | s | | o |
| Black Storm-Petrel | + | s | | o |
| Tristram's (=Sooty) Storm-Petrel | + | + | X | o |
| Least Storm-Petrel | + | s | | o |

| | | | | |
|-----------------------------------|---|---|---|---|
| PHAETHONTIDAE (Tropicbirds) | O | | | |
| White-tailed Tropicbird | s | | X | |
| Red-billed Tropicbird | s | | | |
| Red-tailed Tropicbird | s | | X | |
| SULIDAE (Boobies and Gannets) | O | O | | |
| Masked Booby | + | s | X | |
| Blue-footed Booby | + | s | | |
| Brown Booby | + | s | X | |
| Red-footed Booby | + | s | X | |
| Northern Gannet (=Gannet) | s | + | | |
| PELECANIDAE (Pelicans) | | O | | |
| American White Pelican | | s | | |
| Brown Pelican | | s | | |
| PHALACROCORACIDAE (Cormorants) | | O | | |
| Great Cormorant | + | | | O |
| Double-crested Cormorant | s | | | O |
| Neotropic (=Olivaceous) Cormorant | s | | | O |
| Brandt's Cormorant | s | | | O |
| Pelagic Cormorant | s | | X | X |
| Red-faced Cormorant | + | | X | X |
| ANHINGIDAE (Anhingas) | | O | | |
| Anhinga | | s | | |
| FREGATIDAE (Frigatebirds) | | O | | |
| Great Frigatebird | | s | X | |
| Magnificent Frigatebird | | s | | |
| Lesser Frigatebird | | + | X | |
| ARDEIDAE (Bitterns and Herons) | O | O | | |
| American Bittern | s | s | | O |
| Least Bittern | s | s | | O |
| Yellow (=Chinese) Bittern | | | X | X |
| Schrenk's Bittern | | | X | X |
| Great Blue Heron | s | s | | O |
| Great Egret | s | s | | O |
| Intermediate (=Plumed) Egret | | | X | X |
| Chinese Egret | | | | X |
| Pacific Reef Heron | | | X | |
| Snowy Egret | s | s | | O |
| Little Blue Heron | s | s | | O |
| Tricolored Heron | s | s | | O |
| Reddish Egret | s | s | | O |
| Cattle Egret | s | s | X | O |
| Green (=Green-backed) Heron | s | s | | O |
| Black-crowned Night-Heron | s | s | | O |
| Malay Night-Heron | | | X | O |

| | | | | |
|---|---|---|---|---|
| Japanese Night-Heron | | | X | O |
| Yellow-crowned Night-Heron | S | S | | O |
| Family THRESKIORNITHIDAE (Ibises and Spoonbills) | | | O | |
| White Ibis | | S | | |
| Scarlet Ibis | | ? | | |
| Glossy Ibis | | S | | |
| White-faced Ibis | | S | | |
| Roseate Spoonbill | | S | | |
| Family CICONIIDAE (Storks) | | | O | |
| Jabiru | | S | | |
| Wood Stork | | S | | |
| Family PHOENICOPTERIDAE (Flamingos) | | | O | |
| Greater Flamingo | | S | | |
| Family ANATIDAE (Swans, Geese, and Ducks) | O | O | | |
| Fulvous Whistling-Duck | S | S | | O |
| Black-bellied Whistling-Duck | S | S | | O |
| West Indian Whistling-Duck | + | + | | O |
| Tundra Swan | S | S | | X |
| Whooper Swan | + | + | X | X |
| Trumpeter Swan | S | S | | O |
| Bean Goose | S | + | X | X |
| Greater White-fronted Goose | S | S | X | X |
| Snow Goose | S | S | X | X |
| Ross' Goose | S | S | | O |
| Emperor Goose | S | + | X | X |
| Brant | S | S | X | X |
| Barnacle Goose | S | + | | O |
| ✓ Canada Goose | S | S | X | X |
| ✓ Hawaiian Goose | + | + | | O |
| ✓ Wood Duck | S | S | | O |
| Green-winged Teal | S | S | X | X |
| Baikal Teal | S | + | X | X |
| Falcated Teal | S | + | X | X |
| ✓ American Black Duck | S | + | | O |
| Mottled Duck | + | S | | O |
| ✓ Mallard | S | S | X | X |
| Hawaiian Duck | + | + | | O |
| Laysan Duck | + | + | | O |
| White-cheeked Pintail | + | + | | O |
| Northern Pintail | S | S | X | X |
| Garganey | S | + | X | X |
| Blue-winged Teal | S | S | | O |
| Cinnamon Teal | S | S | | O |
| Northern Shoveler | S | S | X | X |

| | | | | |
|--|---|---|---|---|
| Gadwall | s | s | X | O |
| Eurasian Wigeon | s | s | X | X |
| American Wigeon | s | s | X | X |
| Common Pochard | + | + | X | X |
| Canvasback | s | s | X | O |
| Redhead | s | s | | O |
| Baer's Pochard | | | X | |
| Ring-necked Duck | s | s | | O |
| Tufted Duck | s | + | X | X |
| Greater Scaup | s | s | | X |
| Lesser Scaup | s | s | | O |
| Common Eider | s | + | | X |
| King Eider | s | + | | X |
| Spectacled Eider | s | + | | X |
| Steller's Eider | s | + | X | X |
| Harlequin Duck | s | s | X | X |
| Oldsquaw | s | s | X | X |
| Black Scoter | s | s | X | X |
| Surf Scoter | s | s | | X |
| White-winged Scoter | s | s | X | O |
| Common Goldeneye | s | s | X | X |
| Barrow's Goldeneye | s | + | | O |
| Bufflehead | s | s | X | X |
| Smew | s | + | X | X |
| ✓ Hooded Merganser | s | s | | O |
| Common Merganser | s | s | X | X |
| Red-breasted Merganser | s | s | X | X |
| Ruddy Duck | s | s | | O |
| Masked Duck | + | s | | O |
| CATHARTIDAE (American Vultures) | | | O | |
| Black Vulture | | s | | |
| ✓ Turkey Vulture | | s | | |
| California Condor | | s | | |
| ACCIPITRIDAE (Kites, Eagles, Hawks, and Allies) | | | O | |
| ✓ Osprey | | s | X | X |
| Hook-billed Kite | | s | | O |
| Swallow-tailed (=American Swallow-tailed) Kite | | s | | O |
| White-tailed (=Black-shouldered) Kite | | s | | O |
| Snail Kite | | s | | O |
| Mississippi Kite | | s | | O |
| Black Kite | | | X | X |
| ✓ Bald Eagle | | s | | X |
| White-tailed Eagle | | + | X | X |
| Steller's Sea-Eagle | | + | X | X |
| ✓ Northern Harrier | | s | | X |
| Asiatic Sparrow Hawk | | | X | X |

| | | | | |
|---|---|---|---|---|
| ✓ Sharp-shinned Hawk | S | | | O |
| ✓ Cooper's Hawk | S | | | O |
| ✓ Northern Goshawk | S | | | O |
| ✓ Common Black-Hawk | S | | | O |
| Harris' Hawk | S | | | O |
| Gray Hawk | S | | | O |
| ✓ Red-shouldered Hawk | S | | | O |
| ✓ Broad-winged Hawk | S | | | O |
| Short-tailed Hawk | S | | | O |
| Swainson's Hawk | S | | | O |
| White-tailed Hawk | S | | | O |
| Zone-tailed Hawk | S | | | O |
| Hawaiian Hawk | + | | | O |
| ✓ Red-tailed Hawk | S | | | O |
| Ferruginous Hawk | S | | | O |
| Rough-legged Hawk | S | X | | X |
| ✓ Golden Eagle | S | | | X |
| | | | | |
| FALCONIDAE (Caracaras and Falcons) | O | | | |
| Crested Caracara | S | | | O |
| Eurasian Kestrel | + | | | O |
| American Kestrel | S | | | O |
| Merlin | S | | | X |
| Aplomado Falcon | S | | | O |
| Peregrine Falcon | S | X | | X |
| Gyr Falcon | + | X | | X |
| Prairie Falcon | S | | | O |
| | | | | |
| RALLIDAE (Rails, Gallinules, and Coots) | O | O | | |
| Yellow Rail | S | S | | O |
| Black Rail | + | S | | O |
| Corn Crake | S | + | | O |
| Clapper Rail | S | S | | O |
| King Rail | S | S | | O |
| Virginia Rail | S | S | | O |
| Sora | S | S | | O |
| Yellow-breasted Crake | + | S | | O |
| Purple Gallinule | S | S | | O |
| Common Moorhen | S | S | X | O |
| Eurasian Coot | S | + | X | X |
| Hawaiian (=American) Coot | + | + | | O |
| American Coot | S | S | | O |
| Caribbean Coot | + | + | | O |
| | | | | |
| ARAMIDAE (Limpkins) | | O | | |
| Limkin | | S | | |
| | | | | |
| GRUIDAE (Cranes) | O | O | | |
| Sandhill Crane | S | S | X | X |

| | | | | |
|---|---|---|---|---|
| Common Crane | | | | X |
| Whooping Crane | s | s | | o |
| CHARADRIIDAE (Plovers and Lapwings) | O | O | | |
| Northern Lapwing | s | + | | o |
| Black-bellied Plover | s | s | | X |
| American (=Lesser) Golden-Plover | s | s | X | X |
| Pacific (=Lesser) Golden-Plover | s | s | | o |
| Mongolian Plover | s | + | X | X |
| Great Sand Plover | | | X | o |
| Snowy Plover | s | s | X | o |
| Wilson's Plover | s | s | | o |
| Common Ringed Plover | s | + | X | o |
| Semipalmated Plover | s | s | | X |
| Piping Plover | s | s | | o |
| Little Ringed Plover | | | X | X |
| ✓ Killdeer | s | s | | o |
| Mountain Plover | s | s | | o |
| Eurasian Dotterel | + | + | X | X |
| HAEMATOPODIDAE (Oystercatchers) | O | O | | |
| American Oystercatcher | s | s | | |
| Black Oystercatcher | s | s | | |
| RECURVIROSTRIDAE (Stilts and Avocets) | O | O | | |
| Black-necked Stilt | s | s | | |
| American Avocet | s | s | | |
| JACANIDAE (Jacanas) | | O | | |
| Northern Jacana | | s | | |
| SCOLOPACIDAE (Sandpipers, Phalaropes, and Allies) | O | O | | |
| Common Greenshank | s | + | X | X |
| Greater Yellowlegs | s | s | X | o |
| Lesser Yellowlegs | s | s | | o |
| Marsh Sandpiper | | | | X |
| Spotted Redshank | s | + | X | X |
| Wood Sandpiper | + | + | X | X |
| Solitary Sandpiper | s | s | | o |
| Willet | s | s | | o |
| Wandering Tattler | s | s | X | X |
| Gray-tailed Tattler | + | + | X | X |
| Common Sandpiper | + | + | X | X |
| Spotted Sandpiper | s | s | | o |
| Terek Sandpiper | + | + | | X |
| Upland Sandpiper | s | s | | o |
| Little (=Least) Curlew | | | X | |
| Eskimo Curlew | s | s | X | o |

| | | | | |
|---|---|---|---|---|
| Whimbrel | s | s | X | X |
| Bristle-thighed Curlew | s | + | X | O |
| Far Eastern Curlew | s | + | X | X |
| Long-billed Curlew | s | s | | O |
| Black-tailed Godwit | s | + | | X |
| Hudsonian Godwit | s | s | | O |
| Bar-tailed Godwit | s | + | X | X |
| Marbled Godwit | s | s | | O |
| Ruddy Turnstone | s | s | X | X |
| Black Turnstone | s | s | | O |
| Surfbird | s | s | | O |
| Great Knot | + | + | X | X |
| Red Knot | s | s | X | X |
| Sanderling | s | s | X | X |
| Semipalmated Sandpiper | s | s | | O |
| Western Sandpiper | s | s | | X |
| Red-necked (=Rufous-necked) Stint | s | + | X | X |
| Little Stint | s | + | | O |
| Temminck's Stint | s | + | X | X |
| Long-toed Stint | + | + | X | X |
| Least Sandpiper | s | s | X | O |
| White-rumped Sandpiper | s | s | | O |
| Baird's Sandpiper | s | s | X | X |
| Pectoral Sandpiper | s | s | X | X |
| Sharp-tailed Sandpiper | s | + | X | X |
| Purple Sandpiper | s | + | | O |
| Rock Sandpiper | s | + | | X |
| Dunlin | s | s | X | X |
| Curlew Sandpiper | s | + | X | X |
| Stilt Sandpiper | s | s | | O |
| Spoonbill Sandpiper | s | + | X | X |
| Broad-billed Sandpiper | s | + | X | X |
| Buff-breasted Sandpiper | s | s | X | X |
| Ruff | s | + | X | X |
| Short-billed Dowitcher | s | s | | O |
| Long-billed Dowitcher | s | s | X | X |
| Jack Snipe | | | X | X |
| Common Snipe | s | s | X | X |
| Pin-tailed Snipe | | | | X |
| Swinhoe's Snipe | | | X | X |
| Eurasian Woodcock | s | + | | O |
| ✓American Woodcock | s | s | | O |
| Wilson's Phalarope | s | s | | X |
| Red-necked Phalarope | s | s | X | X |
| Red Phalarope | s | s | X | X |
| LARIDAE (Skuas, Gulls, Terns, and Skimmers) | O | O | | |
| Pomarine Jaeger | s | s | X | X |
| Parasitic Jaeger | s | s | X | X |

| | | | | |
|---|---|---|---|---|
| Long-tailed Jaeger | s | s | X | X |
| Great Skua | s | + | X | O |
| South Polar Skua | s | s | | O |
| Laughing Gull | s | s | | O |
| Franklin's Gull | s | s | | O |
| Little Gull | s | s | | O |
| Black-headed (=Common Black-headed) Gull | s | s | X | X |
| Bonaparte's Gull | s | s | | O |
| Heermann's Gull | s | s | | O |
| Mew Gull | s | s | | X |
| Ring-billed Gull | s | s | | O |
| California Gull | s | s | | O |
| Herring Gull | s | s | X | X |
| Thayer's Gull | s | s | | O |
| Iceland Gull | s | + | | O |
| Lesser Black-backed Gull | s | s | | O |
| Slaty-backed Gull | s | + | X | X |
| Yellow-footed Gull | + | s | | O |
| Western Gull | s | s | | O |
| Glaucous-winged Gull | s | s | X | X |
| Glaucous Gull | s | s | X | X |
| Great Black-backed Gull | s | + | | O |
| Black-legged Kittiwake | s | s | X | X |
| Red-legged Kittiwake | + | + | | X |
| Ross' Gull | s | + | | X |
| Sabine's Gull | s | s | X | X |
| Ivory Gull | s | + | X | X |
| Gull-billed Tern | s | s | | O |
| Caspian Tern | s | s | | O |
| Royal Tern | s | s | | O |
| Elegant Tern | s | s | | O |
| Sandwich Tern | s | s | | O |
| Roseate Tern | s | s | | O |
| Common Tern | s | s | X | X |
| Arctic Tern | s | s | | X |
| Aleutian Tern | + | + | X | X |
| Forster's Tern | s | s | | O |
| Least Tern | s | s | | O |
| Little Tern | | | X | |
| Black-naped Tern | | | X | O |
| Gray-backed Tern | + | + | X | O |
| Bridled Tern | s | s | X | O |
| Sooty Tern | s | s | X | O |
| White-winged Tern | s | + | X | X |
| Black Tern | s | s | | O |
| Brown Noddy | + | s | X | O |
| Black Noddy | + | s | | O |
| Lesser Noddy | | | X | |
| Blue-gray Noddy | + | + | X | O |

| | | | | |
|---|---|---|---|---|
| White Tern | + | S | X | O |
| Black Skimmer | S | S | | O |
| ALCIDAE (Auks, Murres, and Puffins) | | | | |
| Dovekie | S | + | | O |
| Common Murre | S | S | X | X |
| Thick-billed Murre | S | + | X | X |
| Razorbill | S | + | | O |
| Black Guillemot | S | + | | X |
| Pigeon Guillemot | S | S | X | X |
| Marbled Murrelet | S | + | | X |
| Kittlitz's Murrelet | + | + | | X |
| Xantus' Murrelet | S | S | | O |
| Craveri's Murrelet | + | S | | O |
| Ancient Murrelet | S | S | X | X |
| Cassin's Auklet | S | S | | O |
| Paraket Auklet | S | + | X | X |
| Least Auklet | S | + | X | X |
| Whiskered Auklet | + | + | X | X |
| Crested Auklet | S | S | X | X |
| Rhinoceros Auklet | S | S | X | O |
| Tufted Puffin | S | + | X | X |
| Atlantic Puffin | S | + | | O |
| Horned Puffin | S | + | X | X |
| COLUMBIDAE (Pigeons and Doves) | | | | |
| Scaly-naped Pigeon | + | O | | |
| White-crowned Pigeon | + | S | | |
| Red-billed Pigeon | + | S | | |
| Plain Pigeon | + | + | | |
| Band-tailed Pigeon | S | S | | |
| White-winged Dove | + | S | | |
| Zenaida Dove | + | S | | |
| ✓ Mourning Dove | S | S | | |
| Inca Dove | + | S | | |
| Common Ground-Dove | + | S | | |
| Ruddy Ground-Dove | S | S | | |
| White-tipped Dove | + | S | | |
| Key West Quail-Dove | + | + | | |
| Bridled Quail-Dove | + | + | | |
| Ruddy Quail-Dove | + | S | | |
| CUCULIDAE (Cuckoos, Roadrunners, and Allies) | | | | |
| Common Cuckoo | + | + | X | X |
| Oriental Cuckoo | + | + | X | X |
| Hodgson's Hawk-Cuckoo | | | X | X |
| Black-billed Cuckoo | S | S | | O |
| Yellow-billed Cuckoo | S | S | | O |
| Mangrove Cuckoo | + | S | | O |

| | | | | |
|-------------------------------|---|---|---|---|
| Greater Roadrunner | + | S | | O |
| Puerto Rican Lizard-Cuckoo | + | + | | O |
| Smooth-billed Ani | + | + | | O |
| Groove-billed Ani | S | S | | O |
| TYTONIDAE (Barn-Owls) | | | O | |
| Barn Owl (=Common Barn-Owl) | | S | | |
| STRIGIDAE (Typical Owls) | | | O | |
| Flammulated Owl | | S | | O |
| ✓ Eastern Screech-Owl | | S | | O |
| Western Screech-Owl | | S | | O |
| Whiskered Screech-Owl | | S | | O |
| Puerto Rican Screech-Owl | | + | | O |
| ✓ Great Horned Owl | | S | | O |
| Snowy Owl | | + | X | X |
| Hawk Owl (=Northern Hawk-Owl) | | + | | X |
| Northern Pygmy-Owl | | S | | O |
| Ferruginous Pygmy-Owl | | S | | O |
| Elf Owl | | S | | O |
| Burrowing Owl | | S | | O |
| Spotted Owl | | S | | O |
| ✓ Barred Owl | | S | | O |
| Great Gray Owl | | + | | O |
| Long-eared Owl | | S | | O |
| Short-eared owl | | S | X | X |
| Boreal Owl | | + | | X |
| Northern Saw-whet Owl | | S | | O |
| CAPRIMULGIDAE (Goatsuckers) | | O | O | |
| Lesser Nighthawk | | S | S | |
| Common Nighthawk | | S | S | |
| Antillean Nighthawk | | + | + | |
| Pauraque (=Common Pauraque) | | + | S | |
| Common Poorwill | | S | S | |
| Chuck-will's-widow | | S | S | |
| Buff-collared Nightjar | | + | S | |
| ✓ Whip-poor-will | | S | S | |
| Puerto Rican Nightjar | | + | + | |
| Jungle Nightjar | | | | X |
| APODIDAE (Swifts) | | O | O | |
| Black Swift | | S | S | O |
| White-collared Swift | | | ? | |
| Chimney Swift | | S | S | O |
| Vaux's Swift | | S | S | O |
| White-throated Needletail | | | | X |
| Common Swift | | | | X |
| Fork-tailed Swift | | | X | X |
| White-throated Swift | | S | S | O |

| | | | | |
|----------------------------------|---|---|---|---|
| Antillean Palm Swift | + | + | | 0 |
| TROCHILIDAE (Hummingbirds) | | | | |
| Green Violet-ear | + | S | | |
| Antillean Mango | + | + | | |
| Green Mango | + | + | | |
| Green-throated Carib | + | + | | |
| Antillean Crested Hummingbird | + | + | | |
| Puerto Rican Emerald | + | + | | |
| Broad-billed Hummingbird | + | S | | |
| White-eared Hummingbrd | + | S | | |
| Berylline Hummingbird | + | S | | |
| Buff-bellied Hummingbird | + | S | | |
| Violet-crowned Hummingbird | + | S | | |
| Blue-throated Hummingbird | + | S | | |
| Magnificent Hummingbird | + | S | | |
| Plain-capped Starthroat | + | S | | |
| Bahama Woodstar | + | + | | |
| Lucifer Hummingbird | + | S | | |
| ✓ Ruby-throated Hummingbird | S | S | | |
| Black-chinned Hummingbird | S | S | | |
| Anna's Hummingbird | S | S | | |
| Costa's Hummingbird | S | S | | |
| Calliope Hummingbird | S | S | | |
| Broad-tailed Hummingbird | + | S | | |
| Rufous Hummingbird | S | S | | |
| Allen's Hummingbird | + | S | | |
| TROGONIDAE (Trogons) | | | | |
| Elegant Trogon | | | | S |
| Eared Trogon | | | | S |
| UPUPIDAE (Hoopoes) | | | | |
| Hoopoe | | | | X |
| ALCEDINIDAE (Kingfishers) | | | | |
| Ringed Kingfisher | | | | S |
| ✓ Belted Kingfisher | | | | S |
| Green Kingfisher | | | | S |
| PICIDAE (Woodpeckers and Allies) | | | | |
| Eurasian Wryneck | | | X | X |
| Lewis' Woodpecker | S | S | | 0 |
| Red-headed Woodpecker | S | + | | 0 |
| Acorn Woodpecker | + | S | | 0 |
| Gila Woodpecker | + | S | | 0 |
| Golden-fronted Woodpecker | + | S | | 0 |
| ✓ Red-bellied Woodpecker | S | + | | 0 |
| Puerto Rican Woodpecker | + | + | | 0 |
| ✓ Yellow-bellied Sapsucker | S | S | | 0 |

| | | | |
|---|---|---|---|
| ✓ Red-naped (=Yellow-bellied) Sapsucker | S | S | O |
| Red-breasted Sapsucker | S | S | O |
| Williamson's Sapsucker | S | S | O |
| ✓ Ladder-backed Woodpecker | + | S | O |
| Nuttall's Woodpecker | S | S | O |
| ✓ Downy Woodpecker | S | S | O |
| ✓ Hairy Woodpecker | S | S | O |
| Strickland's Woodpecker | + | S | O |
| Red-cockaded Woodpecker | + | + | O |
| White-headed Woodpecker | S | + | O |
| Three-toed Woodpecker | S | + | O |
| Black-backed Woodpecker | S | + | O |
| ✓ Northern Flicker | S | S | O |
| Gilded (=Northern Flicker) | + | S | O |
| ✓ Pileated Woodpecker | S | + | O |
| Ivory-billed Woodpecker | + | + | O |
| TYRANNIDAE (Tyrant Flycatchers) | O | O | |
| Caribbean Elaenia | + | S | |
| Northern Beardless-Tyrannulet | + | S | |
| Olive-sided Flycatcher | S | S | |
| Greater Pewee | + | S | |
| Western Wood-Pewee | S | S | |
| ✓ Eastern Wood-Pewee | S | S | |
| Lesser Antillean Pewee | + | + | |
| Yellow-bellied Flycatcher | S | S | |
| Acadian Flycatcher | S | S | |
| Alder Flycatcher | S | S | |
| Willow Flycatcher | S | S | |
| Least Flycatcher | S | S | |
| Hammond's Flycatcher | S | S | |
| Dusky Flycatcher | S | S | |
| Gray Flycatcher | S | S | |
| Pacific-slope (=Western) Flycatcher | S | S | |
| Cordilleran (=Western) Flycatcher | S | S | |
| Buff-breasted Flycatcher | + | S | |
| Black Phoebe | S | S | |
| ✓ Eastern Phoebe | S | S | |
| Say's Phoebe | S | S | |
| Vermilion Flycatcher | S | S | |
| Dusky-capped Flycatcher | + | S | |
| Ash-throated Flycatcher | S | S | |
| Nutting's Flycatcher | | ? | |
| Great Crested Flycatcher | S | S | |
| Brown-crested Flycatcher | S | S | |
| Puerto Rican Flycatcher | + | + | |
| Great Kiskadee | + | S | |
| Sulphur-bellied Flycatcher | + | S | |
| Tropical Kingbird | S | S | |
| Couch's Kingbird | + | S | |

| | | | | |
|-------------------------------------|---|---|---|---|
| Cassin's Kingbird | S | S | | |
| Thick-billed Kingbird | S | S | | |
| Western Kingbird | S | S | | |
| Eastern Kingbird | S | S | | |
| Gray Kingbird | S | S | | |
| Loggerhead Kingbird | + | + | | |
| Scissor-tailed Flycatcher | S | S | | |
| Fork-tailed Flycatcher | S | S | | |
| Rose-throated Becard | + | S | | |
| | | | | |
| ALAUDIDAE (Larks) | O | O | | |
| Sky (=Eurasian) Lark (=Skylark) | + | + | X | X |
| Horned Lark | S | S | | X |
| | | | | |
| HIRUNDINIDAE (Typical Swallows) | O | O | | |
| ✓ Purple Martin | S | S | | O |
| Cuban Martin | + | + | | O |
| Caribbean Martin | + | + | | O |
| Gray-breasted Martin | + | S | | O |
| Tree Swallow | S | S | | X |
| Violet-green Swallow | S | S | | O |
| Bahama Swallow | + | + | | O |
| Northern Rough-winged Swallow | S | S | | O |
| Bank Swallow | S | S | X | X |
| Cliff Swallow | S | S | | X |
| Cave Swallow | S | S | | O |
| ✓ Barn Swallow | S | S | X | X |
| Common House-Martin | | | | X |
| | | | | |
| CORVIDAE (Jays, Magpies, and Crows) | | O | | |
| Gray Jay | | + | | O |
| Steller's Jay | | S | | O |
| ✓ Blue Jay | | + | | O |
| Green Jay | | S | | O |
| Brown Jay | | S | | O |
| Florida (=Scrub) Scrub-Jay (=Jay) | | + | | O |
| Island (=Scrub) Scrub-Jay (=Jay) | | + | | O |
| Western (=Scrub) Scrub-Jay (=Jay) | | S | | O |
| Gray-breasted Jay | | S | | O |
| Pinyon Jay | | S | | O |
| Clark's Nutcracker | | S | | O |
| Black-billed Magpie | | + | | O |
| Yellow-billed Magpie | | + | | O |
| ✓ American Crow | | S | | O |
| Northwestern Crow | | + | | O |
| White-necked Crow | | + | | O |
| Mexican Crow | | S | | O |
| Fish Crow | | + | | O |
| Hawaiian Crow | | + | | O |
| Chihuahuan Raven | | + | | O |

| | | | | | |
|---|---|---|---|---|---|
| ✓ Common Raven | | s | | | X |
| PARIDAE (Titmice) | O | O | | | |
| ✓ Black-capped Chickadee | s | + | | | |
| ✓ Carolina Chickadee | s | + | | | |
| Mexican Chickadee | + | s | | | |
| Mountain Chickadee | s | s | | | |
| Siberian Tit | s | + | | | |
| Boreal Chickadee | s | + | | | |
| Chestnut-backed Chickadee | s | + | | | |
| Bridled Titmouse | + | s | | | |
| Plain Titmouse | + | s | | | |
| ✓ Tufted Titmouse | s | + | | | |
| REMIZIDAE (Verdins) | | O | | | |
| Verdin | | s | | | |
| AEGITHALIDAE (Bushtits) | O | O | | | |
| Bushtit | s | s | | | |
| SITTIDAE (Nuthatches) | O | O | | | |
| ✓ Red-breasted Nuthatch | s | s | | | |
| ✓ White-breasted Nuthatch | s | s | | | |
| Pygmy Nuthatch | s | s | | | |
| Brown-headed Nuthatch | + | + | | | |
| CERTHIIDAE (Creepers) | O | O | | | |
| ✓ Brown Creeper | s | s | | | |
| TROGLODYTIDAE (Wrens) | O | O | | | |
| Cactus Wren | + | s | | | |
| Rock Wren | s | s | | | |
| Canyon Wren | s | s | | | |
| ✓ Carolina Wren | s | s | | | |
| Bewick's Wren | s | s | | | |
| ✓ House Wren | s | s | | | |
| Winter Wren | s | s | | | |
| Sedge Wren | s | s | | | |
| Marsh Wren | s | s | | | |
| CINCLIDAE (Dippers) | O | | | | |
| American Dipper | s | | | | |
| MUSCICAPIDAE (Kinglets, Gnatcatchers, Thrushes, and Allies) | O | | | | |
| Middendorff's Grasshopper-Warbler | + | + | X | X | |
| Arctic Warbler | + | s | X | X | |
| Willow Warbler | | | | | X |
| ✓ Golden-crowned Kinglet | s | s | | | O |
| ✓ Ruby-crowned Kinglet | s | s | | | O |

| | | | | |
|--|---|---|---|---|
| ✓ Blue-gray Gnatcatcher | S | S | | O |
| Black-tailed Gnatcatcher | + | S | | O |
| California (=Black-tailed) Gnatcatcher | + | S | | O |
| Black-capped Gnatcatcher | + | S | | O |
| Gray-spotted Flycatcher | | | X | X |
| Narcissus Flycatcher | | | X | |
| Turdinae | O | O | | |
| Siberian Rubythroat | S | + | X | X |
| Bluethroat | S | + | | X |
| Blue Rock Thrush | | | | X |
| Northern Wheatear | S | S | | X |
| ✓ Eastern Bluebird | S | S | | O |
| Western Bluebird | S | S | | O |
| Mountain Bluebird | S | S | | O |
| Townsend's Solitaire | S | S | | O |
| Kamoa (=Hawaiian Thrush) | + | + | | O |
| Olomao (=Hawaiian Thrush) | + | + | | O |
| Omao (=Hawaiian Thrush) | + | + | | O |
| Puaiohi (=Small Hawaiian Thrush) | + | + | | O |
| ✓ Veery | S | S | | O |
| Gray-cheeked Thrush | S | S | | X |
| Bicknell's (=Gray-cheeked) Thrush | S | + | | O |
| Swainson's Thrush | S | S | | X |
| ✓ Hermit Thrush | S | S | | O |
| ✓ Wood Thrush | S | S | | O |
| Red-legged Thrush | + | + | | O |
| Eyebrowed (=Eye-browed) Thrush | + | + | X | X |
| Dusky Thrush | + | + | | O |
| Fieldfare | | | | X |
| Clay-colored Robin | + | S | | O |
| Rufous-backed Robin | + | S | | O |
| ✓ American Robin | S | S | | O |
| Varied Thrush | S | S | | O |
| Aztec Thrush | + | S | | O |
| MIMIDAE (Mockingbirds, Thrashers, and Allies) | O | O | | |
| ✓ Gray Catbird | S | S | | |
| ✓ Northern Mockingbird | S | S | | |
| Sage Thrasher | S | S | | |
| ✓ Brown Thrasher | S | S | | |
| Long-billed Thrasher | + | S | | |
| Bendire's Thrasher | + | S | | |
| California Thrasher | + | S | | |
| Crissal Thrasher | + | S | | |
| Le Conte's Thrasher | + | S | | |
| Pearly-eyed Thrasher | + | + | | |
| PRUNELLIDAE (Accentors) | | | | |
| Siberian Accentor | | | X | X |

| | | | | |
|-------------------------------------|---|---|---|---|
| MOTACILLIDAE (Wagtails and Pipits) | O | O | | |
| Yellow Wagtail | S | + | X | X |
| Gray Wagtail | S | + | X | X |
| White Wagtail | S | S | X | X |
| Black-backed Wagtail | S | + | | O |
| Olive-backed (=Olive) Pipit (=Tree- | + | + | X | X |
| Pipit) | | | | |
| Pechora Pipit | + | + | | X |
| Red-throated Pipit | S | + | X | X |
| American (=Water) Pipit | S | S | X | X |
| Sprague"s Pipit | S | S | | O |
| BOMBYCILLIDAE (Waxwings) | O | O | | |
| Bohemian Waxwing | S | + | | |
| ✓ Cedar Waxwing | S | S | | |
| PTILOGONATIDAE (Silky-flycatchers) | | O | | |
| Phainopepla | | S | | |
| LANIIDAE (Shrikes) | O | O | | |
| Northern Shrike | S | + | | X |
| Loggerhead Shrike | S | S | | O |
| STURNIDAE (Starlings) | | | | |
| Violet-backed Starling | | | X | |
| Ashy Starling | | | X | |
| VIREONIDAE (Vireos) | O | O | | |
| White-eyed Vireo | S | S | | |
| Puerto Rican Vireo | + | + | | |
| Bell's Vireo | S | S | | |
| ✓ Black-capped Vireo | + | S | | |
| Gray Vireo | + | S | | |
| Solitary Vireo | S | S | | |
| Yellow-throated Vireo | S | S | | |
| Hutton's Vireo | S | S | | |
| Warbling Vireo | S | S | | |
| Philadelphia Vireo | S | S | | |
| ✓ Red-eyed Vireo | S | S | | |
| Yellow-green (=Red-eyed) Vireo | + | S | | |
| Black-whiskered Vireo | + | S | | |
| EMBERIZIDAE (Emberizids) | | | | |
| PARULINAE (Wood-Warblers) | O | O | | |
| Bachman's Warbler | + | + | | O |
| Blue-winged Warbler | S | S | | O |
| Golden-winged Warbler | S | S | | O |
| ✓ Tennessee Warbler | S | S | | O |
| Orange-crowned Warbler | S | S | | O |

| | | | |
|------------------------------|---|---|---|
| Nashville Warbler | S | S | O |
| Virginia's Warbler | S | S | O |
| Colima Warbler | + | S | O |
| Lucy's Warbler | + | S | O |
| Northern Parula | S | S | O |
| Tropical Parula | + | S | O |
| ✓Yellow Warbler | S | S | O |
| ✓Chestnut-sided Warbler | S | S | O |
| ✓Magnolia Warbler | S | S | O |
| Cape May Warbler | S | S | O |
| Black-throated Blue Warbler | S | S | O |
| ✓Yellow-rumped Warbler | S | S | X |
| Black-throated Gray Warbler | S | S | O |
| Townsend's Warbler | S | S | O |
| Hermit Warbler | S | S | O |
| Black-throated Green Warbler | S | S | O |
| Golden-cheeked Warbler | + | S | O |
| Blackburnian Warbler | S | S | O |
| ✓Yellow-throated Warbler | S | S | O |
| Grace's Warbler | + | S | O |
| Adelaide's Warbler | + | + | O |
| Pine Warbler | S | S | O |
| Kirtland's Warbler | S | + | O |
| Prairie Warbler | S | S | O |
| Palm Warbler | S | S | O |
| ✓Bay-breasted Warbler | S | S | O |
| Blackpoll Warbler | S | S | O |
| Cerulean Warbler | S | S | O |
| Elfin Woods Warbler | + | + | O |
| ✓Black-and-white Warbler | S | S | O |
| ✓American Redstart | S | S | O |
| Prothonotary Warbler | S | S | O |
| ✓Worm-eating Warbler | S | S | O |
| Swainson's Warbler | S | S | O |
| ✓Ovenbird | S | S | O |
| Northern Waterthrush | S | S | X |
| Louisiana Waterthrush | S | S | O |
| Kentucky Warbler | S | S | O |
| Connecticut Warbler | S | + | O |
| ✓Mourning Warbler | S | S | O |
| MacGillivray's Warbler | S | S | O |
| ✓Common Yellowthroat | S | S | O |
| Gray-crowned Yellowthroat | + | S | O |
| Hooded Warbler | S | S | O |
| Wilson's Warbler | S | S | O |
| Canada Warbler | S | S | O |
| Red-faced Warbler | + | S | O |
| ✓Painted Redstart | S | S | O |
| Slate-throated Redstart | | ? | |
| Golden-crowned Warbler | + | S | O |

| | | | |
|--|---|---|---|
| Rufous-capped Warbler | + | S | O |
| ✓Yellow-breasted Chat | S | S | O |
| Olive Warbler | + | S | O |
| THRAUPINAE (Tanagers) | O | O | |
| Stripe-headed Tanager | + | S | |
| Puerto Rican Tanager | + | + | |
| Hepatic Tanager | + | S | |
| Summer Tanager | S | S | |
| ✓Scarlet Tanager | S | S | |
| Western Tanager | S | S | |
| Antillean Euphonia | + | + | |
| CARDINALINAE (Cardinals, Grosbeaks, and Allies) | O | O | |
| Crimson-collared Grosbeak | + | S | |
| Northern Cardinal | S | S | |
| Pyrrhuloxia | + | S | |
| Yellow Grosbeak | + | S | |
| ✓Rose-breasted Grosbeak | S | S | |
| Black-headed Grosbeak | S | S | |
| Blue Grosbeak | S | S | |
| Lazuli Bunting | S | S | |
| ✓Indigo Bunting | S | S | |
| Varied Bunting | + | S | |
| Painted Bunting | S | S | |
| Dickcissel | S | S | |
| EMBERIZINAE (Sparrows and Allies) | O | O | |
| Olive Sparrow | + | S | O |
| Green-tailed Towhee | S | S | O |
| ✓Eastern (=Rufous-sided) Towhee | S | + | O |
| Spotted (=Rufous-sided) Towhee | S | S | O |
| Canyon (=Brown) Towhee | + | S | O |
| California (=Brown) Towhee | + | S | O |
| Abert's Towhee | + | S | O |
| White-collared Seedeater | + | S | O |
| Yellow-faced Grassquit | + | S | O |
| Black-faced Grassquit | + | + | O |
| Puerto Rican Bullfinch | + | + | O |
| Bachman's Sparrow | S | + | O |
| Botteri's Sparrow | + | S | O |
| Cassin's Sparrow | S | S | O |
| Rufous-winged Sparrow | + | S | O |
| Rufous-crowned Sparrow | + | S | O |
| American Tree Sparrow | S | + | O |
| ✓Chipping Sparrow | S | S | O |
| Clay-colored Sparrow | S | S | O |
| Brewer's Sparrow | S | S | O |
| ✓Field Sparrow | S | S | O |
| Worthen's Sparrow | + | S | O |
| Black-chinned Sparrow | + | S | O |
| ✓Vesper Sparrow | S | S | O |

| | | | | |
|--|---|---|---|---|
| ✓ Lark Sparrow | s | s | | o |
| Black-throated Sparrow | s | s | | o |
| Sage Sparrow | s | s | | o |
| Five-striped Sparrow | + | s | | o |
| Lark Bunting | s | s | | o |
| Savannah Sparrow | s | s | | X |
| Baird's Sparrow | s | s | | o |
| Grasshopper Sparrow | s | s | | o |
| Henslow's Sparrow | s | + | | o |
| Le Conte's Sparrow | s | s | | o |
| Saltmarsh Sharp-tailed (=Sharp-tailed) Sparrow | s | + | | o |
| Nelson's Sharp-tailed (=Sharp-tailed) Sparrow | s | s | | o |
| Seaside Sparrow | s | s | | o |
| ✓ Fox Sparrow | s | s | X | X |
| ✓ Song Sparrow | s | s | | o |
| Lincoln's Sparrow | s | s | | o |
| ✓ Swamp Sparrow | s | s | | o |
| White-throated Sparrow | s | s | | o |
| Golden-crowned Sparrow | s | s | X | o |
| White-crowned Sparrow | s | s | X | o |
| Harris' Sparrow | s | + | | o |
| ✓ Dark-eyed Junco | s | s | | X |
| Yellow-eyed Junco | + | s | | o |
| Rustic Bunting | s | + | X | X |
| Pallas' Bunting (=Reed-Bunting) | | | | X |
| Reed (=Common) Bunting (=Reed-Bunting) | + | + | | o |
| McCown's Longspur | s | s | | o |
| Lapland Longspur | s | s | | X |
| Smith's Longspur | s | + | | o |
| Chestnut-collared Longspur | s | s | | o |
| Snow Bunting | s | + | | X |
| McKay's Bunting | s | + | | o |
| ICTERIDAE (Blackbirds and Allies) | O | O | | |
| Boblink | s | s | | |
| ✓ Red-winged Blackbird | | s | | |
| Tricolored Blackbird | | s | | |
| Tawny-shouldered Blackbird | | + | | |
| Yellow-shouldered Blackbird | | + | | |
| Eastern Meadowlark | s | s | | |
| Western Meadowlark | s | s | | |
| Yellow-headed Blackbird | | s | | |
| ✓ Rusty Blackbird | | s | | |
| ✓ Brewer's Blackbird | | s | | |
| Great-tailed Grackle | | s | | |
| ✓ Boat-tailed Grackle | | + | | |
| ✓ Common Grackle | | + | | |
| Greater Antillean Grackle | | + | | |
| Shiny Cowbird | | + | | |

| | | | | |
|---|---|---|---|---|
| ✓ Bronzed Cowbird | | S | | |
| ✓ Brown-headed Cowbird | | S | | |
| Black-cowled Oriole | S | S | | |
| Black-vented Oriole | | ? | | |
| ✓ Orchard Oriole | S | S | | |
| Hooded Oriole | + | S | | |
| Streak-backed Oriole | + | S | | |
| Altamira Oriole | + | S | | |
| Audubon's Oriole | + | S | | |
| ✓ Baltimore (=Northern) Oriole | S | S | | |
| Bullock's (=Northern) Oriole | S | S | | |
| Scott's Oriole | S | S | | |
| FRINGILLIDAE (Finches) | O | O | | |
| FRINGILLINAE | O | O | | |
| Brambling | S | + | X | X |
| CARDUELINAE | O | O | | |
| Black (=Rosy) Rosy-Finch (=Finch) | + | + | | O |
| Brown-capped (=Rosy) Rosy-Finch (=Finch) | + | + | | O |
| Gray-crowned (=Rosy) Rosy-Finch (=Finch) | S | + | | O |
| Pine Grosbeak | S | + | X | O |
| Common Rosefinch | + | + | | X |
| ✓ Purple Finch | S | S | | O |
| Cassin's Finch | S | S | | O |
| ✓ House Finch | S | S | | O |
| Red Crossbill | S | S | | O |
| White-winged Crossbill | S | + | | O |
| ✓ Common Redpoll | S | + | X | X |
| Hoary Redpoll | S | + | X | X |
| ✓ Pine Siskin | S | S | | O |
| Lesser Goldfinch | S | S | | O |
| Lawrence's Goldfinch | + | S | | O |
| ✓ American Goldfinch | S | S | | O |
| Oriental Greenfinch | + | + | | O |
| Eurasian Bullfinch | + | + | X | X |
| ✓ Evening Grosbeak | S | S | | O |
| Hawfinch | + | + | X | X |

Bird sightings by Maggie Condon
 in Washington Ct. in the area
 of Makers Swamp & Rabbit Hill
 W-50
 Road.

BIRDS PROTECTED BY THE MIGRATORY BIRD TREATY ACT

Species Protected by Each Migratory Bird Convention

2007 Thru
 5.15.2009

The United States has entered into four international migratory bird conventions (with Canada, Mexico, Japan, and Russia). Each of these conventions provides protection to a select group of species. The Canadian convention identifies protected groups by Family or species group names (for example, Anatidae, Rallidae, loons, warblers, and so forth). The Mexican convention identifies protected groups by Family names. The Japanese and Russian conventions identify protected species in Appendices to the conventions.

The following list identifies those species protected by each of the conventions.

Column headings:

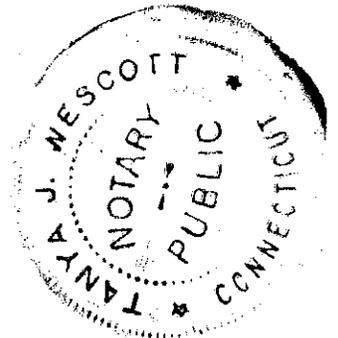
- C = Canadian
- M = Mexican
- J = Japanese
- R = Russian

Symbols:

- O = Family (or Subfamily) listed in convention (Canada and Mexico only)
- s = occurs regularly in both countries (Canada and Mexico only);
- + = occurs regularly in the U.S. but not Canada or Mexico (Canada and Mexico only);
- ? = status in U.S. is uncertain, and eligibility for continued protection is under review (Mexico only)
- X = listed in Appendix to convention (Japan and Russia only);
- o = belongs to same Family as species listed in Appendix to convention and occurs regularly in the U.S. (Russia only)

| <u>English Name</u> | <u>C</u> | <u>M</u> | <u>J</u> | <u>R</u> |
|------------------------|----------|----------|----------|----------|
| GAVIIDAE (Loons) | O | O | | |
| Red-throated Loon | s | s | X | X |
| Arctic Loon | s | + | X | X |
| Pacific (=Arctic) Loon | s | | | X |
| Common Loon | s | s | | o |
| Yellow-billed Loon | s | s | X | X |
| PODICIPEDIDAE (Grebes) | O | O | | |
| Least Grebe | + | s | | o |
| Pied-billed Grebe | s | s | | o |
| Horned Grebe | s | s | X | X |
| Red-necked Grebe | s | + | X | X |
| Eared Grebe | s | s | | o |

5.18.09
 M Condon
 Maggie Condon



5/18/09 Personally Appeared Maggie Condon
 and she swears information is true.

Tanya Wescott
 Com Exp

Blimberg No. 5110

EXHIBIT

WCC52



The Atlas of
Breeding Birds of Connecticut

W. Brewster

Marked to show
Steps A and B
(Pocket 33-46)

STATE GEOLOGICAL AND NATURAL HISTORY SURVEY OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Atlas of Breeding Birds of Connecticut

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Illustrated by Michael DiGiorgio

Contributing editors:

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Handwritten note: *For Block A + B*

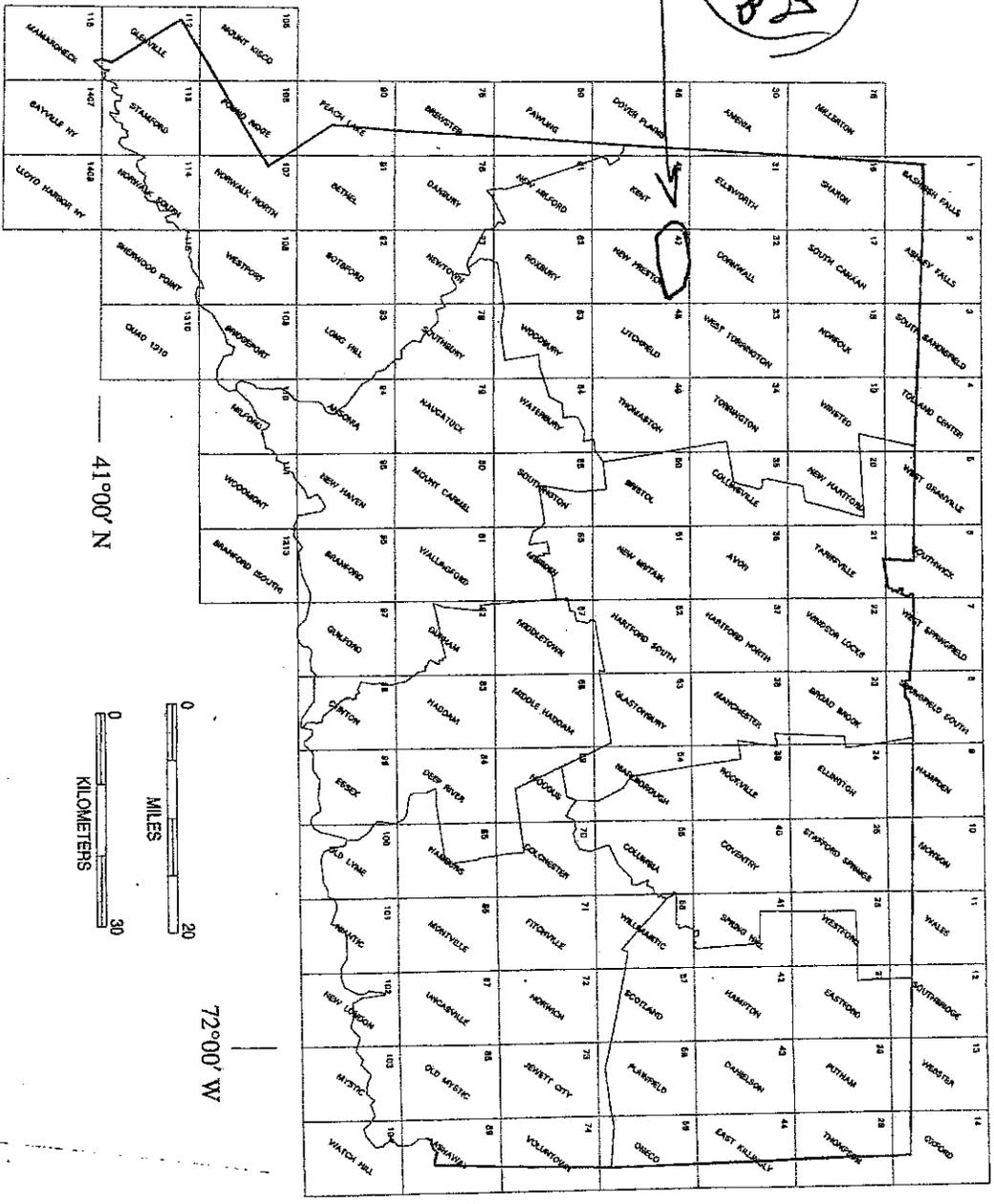
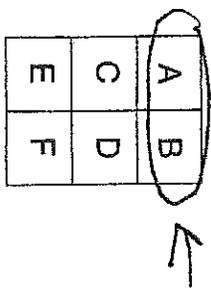


Figure 1. Index of atlas maps. The USGS quadrangles (7.5 minute series) were divided into six equal parts, termed blocks. These blocks were assigned a letter from A-F starting at the northwest corner of each quadrangle. Quadrangles are numbered as in the *Atlas of Connecticut Topographic Maps* (DEP 1992).

HOW TO READ THE ATLAS MAPS

USGS Quadrangles (7.5 minute series) shown to the left were divided into six parts.

Blocks are identified by the quadrangle number plus the letter assigned to each part of the map.



Breeding evidence symbols

- Confirmed
- Probable
- Possible

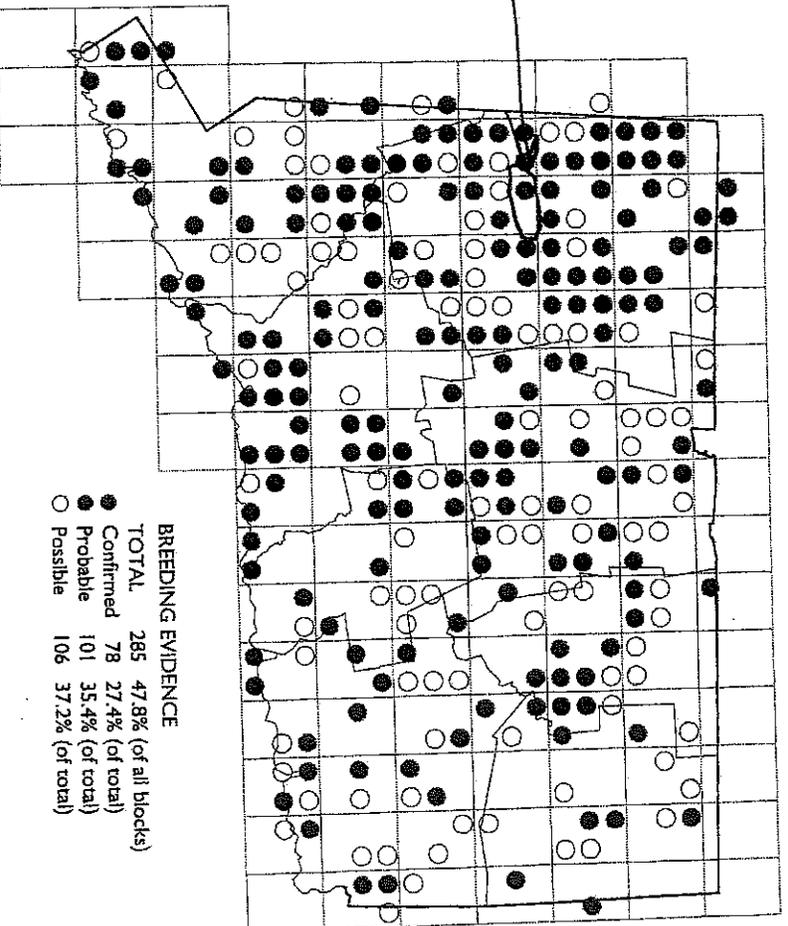
The 5km x 5km square blocks are not shown within the quadrangle grid for each species map, but dots are always in the center of the blocks in which breeding evidence was reported.

American Kestrel
Falco sparverius

Sites A-F-B

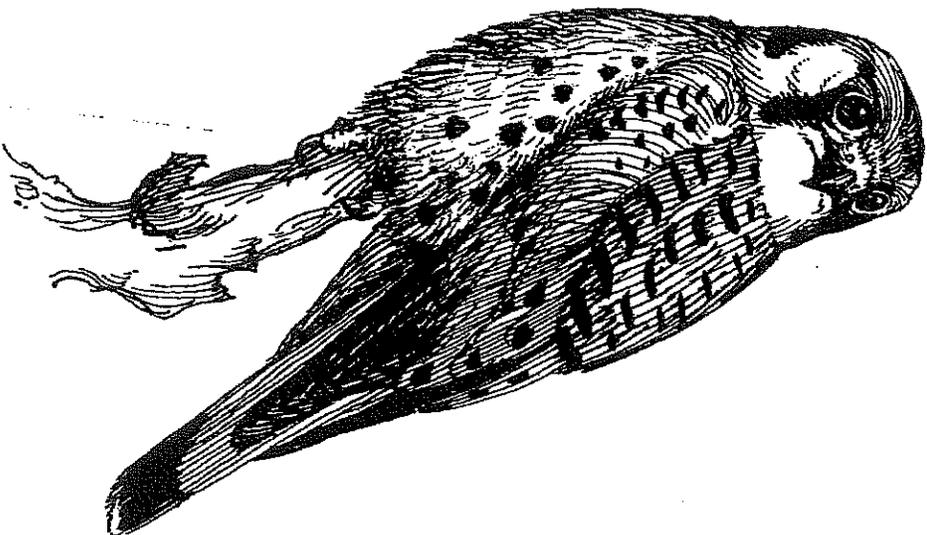
The American Kestrel is an uncommon to fairly common breeder in Connecticut. A few are seen in the state throughout the year perching on wires or foraging along the grassy shoulders of roadways; kestrels are fairly common migrants, especially in fall. The species' breeding range extends from central Alaska and much of forested Canada southward to Mexico, locally to Nicaragua, and also throughout South America to Tierra del Fuego. Most northern birds (subspecies *sparverius*), including Connecticut breeders, withdraw to the south in winter, some as far as Panama (AOU 1957).

Habitat—The two primary requirements of American Kestrels are open terrain for hunting and cavities, particularly tree holes, for nesting. Among its favored habitats are grassland or shrubland at the edge of forest or open coun-



try with scattered trees; even urban open space is used if suitable perches and nest sites are available. In Connecticut, American Kestrels are usually seen around agricultural areas, airports, large parks, and power line rights-of-way. Kestrels most frequently capture prey on the ground or in short aerial attacks and either eat the item in its entirety or, during the breeding sea-

son, may cache it in one of several predetermined sites (Balgooyen 1976). In Connecticut, kestrels begin laying eggs in late April; natural tree cavities, flicker holes, nest boxes, or holes in buildings are most frequently used. The fledged young and adults often form family groups that remain together for several weeks before dispersing southward during the fall migration.



Atlas results—The species was recorded in all sections of Connecticut, although less densely in the eastern third of the state. The occurrence of suitable habitat throughout much of eastern Connecticut suggests the possibility that coverage was not as thorough there and that this falcon might be more widespread than indicated.

Discussion—The former status of the American Kestrel as a breeder in Connecticut is difficult to assess because its year-round presence hides a complex pattern of movements. They undoubtedly increased as farmland replaced forest and remained widespread until more recently. Sage et al. (1913) noted that they increased as a migrant at the turn of the century but

characterized the breeding status as still comparatively rare, similar to what it was in the late 1800s (Merriam 1877). In contrast to Sage et al., this species was reported as a rare migrant in eastern Massachusetts between the 1880s and the 1920s but was said to be a common summer resident by the middle of the century (Griscom 1949). More recently, there is an impression of declining numbers in Connecticut. This might be due to the loss of open foraging areas following the extensive regrowth of forests and the loss of nest cavities now that dead trees are quickly cut for firewood. This trend may be at least partially mitigated by placement of nest boxes, which kestrels will readily utilize.

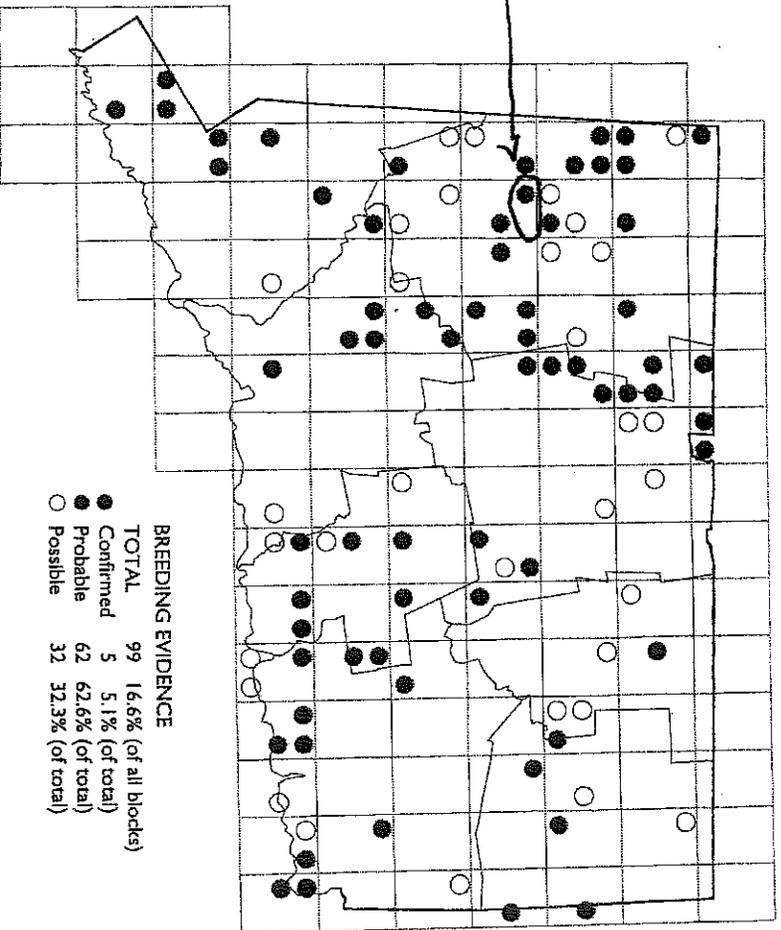
Dwight G. Smith and Arnold Devine

Whip-poor-will
Caprimulgus vociferus

Stiles A.B.

The Whip-poor-will is a migratory breeder in Connecticut. The species has been widespread as a breeder though apparently less common than in coastal states to the south. The Whip-poor-will is designated as a Species of Special Concern in Connecticut based on a perceived decline in breeding numbers.

Birds breeding from southern Canada and throughout the eastern United States are the nominate subspecies *vociferus*, which winters from the southeastern United States and northern Mexico to Costa Rica, where rare, and western Panama (two records; Ridgely and Gwynne 1989). The calls and egg color of birds breeding in the southwestern United States south to Honduras differ markedly from the "Eastern" Whip-poor-wills, suggesting possibly different species (Stiles and Skutch 1989).



Habitat—Whip-poor-wills are found in scrubby immature woods or areas of regrowth following disturbance in more mature forests. Sites are often on relatively dry, sandy soils; plant growth on such soils may be retarded, thus retaining a more open canopy that is favored by the birds. Because Whip-poor-wills apparently find their insect food by sight (Mills 1986), dense forest is an

unsuitable habitat. In contrast to the wooded areas used by the Whip-poor-will, the Common Nighthawk, originally an occupant of open country, now occurs in urban sites.

Atlas results—The Whip-poor-will was found to be widespread in the state, but difficulties observing the species led to a low rate of confirmations of breeding.

Because block busting efforts were conducted principally during daylight and less effort was expended to find nocturnal species, there is a strong possibility that the species was missed in less intensively surveyed blocks. Whip-poor-wills call to the greatest extent on moonlit nights (R. J. Cooper 1981, Mills 1986) and hence are most easily found then. On darker nights, Whip-poor-wills may call only during the period of twilight at dusk and dawn and hence may be difficult to detect without special effort.

Discussion—Linsley (1843) rated the Whip-poor-will as common for the state though he noted that they had become somewhat rare in Fairfield County. Both Merriam (1877) and Sage et al. (1913) considered the species to be common in the state.

The spread of extensively developed suburbs near cities has eliminated much breeding habitat for Whip-poor-wills in the state. Seemingly suitable habitat for Whip-poor-wills appears to exist more widely across the state than indicated

by the number of localities found during the atlas survey. This apparent discrepancy might be due to problems in obtaining adequate coverage for a species difficult to detect or might reflect a genuine shortage of birds. Because Whip-poor-wills have not been closely monitored by any long term survey, there is no firm basis for determining whether their numbers in the state have changed. Nevertheless, there is at least a suspicion that the species is now less common than formerly, and Breeding Bird Survey data for southern New England support this impression. Observers in Vermont and New York have perceived a decline in the



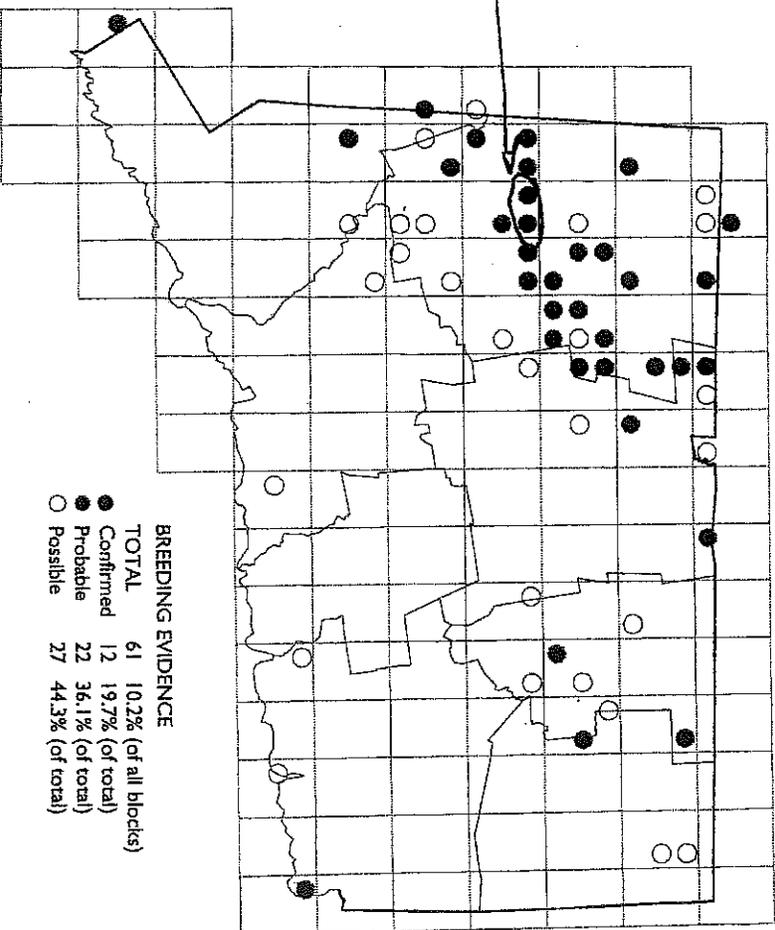
Northeast, and both Kibbe (*in* Laughlin and Kibbe 1985) and Sibley (*in* Andrie and Carroll 1988) suggested that this might be linked to losses of silk moths (Saturniidae), a major source of food for Whip-poor-wills. From a conservation viewpoint, this a species for which we need to know more.

George A. Clark, Jr.

Alder Flycatcher
Empidonax alorum

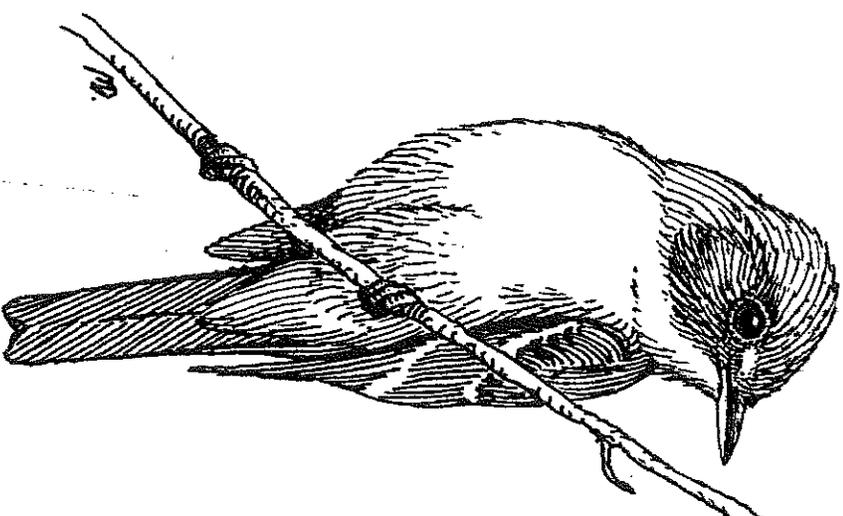
See A+B

The Alder Flycatcher is a rare and local migratory breeder that winters in South America. Because Alder and Willow Flycatchers are virtually inseparable by measurements even when held in the hand (Seutin 1991), present ideas on the difference in their wintering ranges were initially based on Gorski's studies (1969b, 1971) of responses of wintering birds to broadcasting of tape-recorded vocalizations given by birds on the breeding grounds. He recognized that Alder Flycatcher gives a distinctive 'pit' call, which distinguishes it from the Willow Flycatcher's lower 'whir' call. He thus identified Willow Flycatchers in Panama and only Alders in South America, indicating a leapfrog migration in which the more northern breeding Alders migrate further south for the winter. The songs also differ—the Alder produces a buzzy 'fee-bee-o' and the Willow an explosive 'fitz-bew.'



Habitat—This species occupies areas with an interspersion of low vegetation including shrubs with trees over eight feet high in the vicinity of streams or other open water. The nest is characteristically a cup with straggling pieces of vegetation hanging beneath and placed low and not over water, less than three feet off the ground in thickets of hawthorn, spiraea, buttonbush, or alder.

Atlas results—Breeding was primarily in the northern part of the state, especially the northwest. Apparently, the Alder Flycatcher's range in New England extends southward through the Berkshires into northwestern Connecticut and southward sparingly through the hills of central Massachusetts into northeastern Connecticut, where it is presently an erratic summer visitor.



Discussion—Because this species has been officially recognized as distinct from the Willow Flycatcher only since 1973 (*Auk* 90:415–416), accurate details of its historic status are sketchy. Presumably this species has been breeding in Connecticut since colonial times, but evidence to support this assumption is limited. Sage et al. (1913) reported finding three nests 1–2 feet off the ground at Litchfield in 1905, the nest height clearly indicating Alder Flycatchers. Enders and Magee (1965) recorded both Alder and Willow Flycatchers in the summer at Litchfield, and their survey led to Gorski's detailed investigations (1969a, 1970a, 1970b) of these birds in that area. Using color banding and sound spectrographic analysis of vocalizations, Gorski found no evidence for interbreeding between the two song types, thus confirming the conclusion of Stein (1958, 1963) that the Trail's Flycatcher should be separated into two species. In the Litchfield area, habitat and nest structure of the Alder Flycatcher were like those reported by Stein from other states.

The idea that the Alder Flycatcher has been partially replaced by an expanding population of Willow Flycatchers is discussed in the account for the latter. At present, the Alder Flycatcher is a regular breeder only in northwestern Connecticut. Singing non-breeders are noted in summer south in the west to Greenwich, Fairfield County, and in the east to Chaplin, Windham County. Exceptional was an Alder Flycatcher present throughout the summer of 1974 at Deep River along the Connecticut River Craig (1975).

Because the status of this species may be changing relatively rapidly, continued monitoring is desirable. The Alder Flycatcher is recognized by vocalizations including the 'wee-bee-o' song and a sharp 'pip' call note that is slightly higher pitched (about 1,000 hertz higher) than that of the Willow Flycatcher. The Alder builds an untidy cup nest unlike the neat cup built by the Willow Flycatcher. Alder and Willow Flycatchers might be relatively easily missed by observers in view of the similarities of their vocalizations, a frequent

silence even when present in numbers, and the use of habitats that are often not easily penetrated by people.

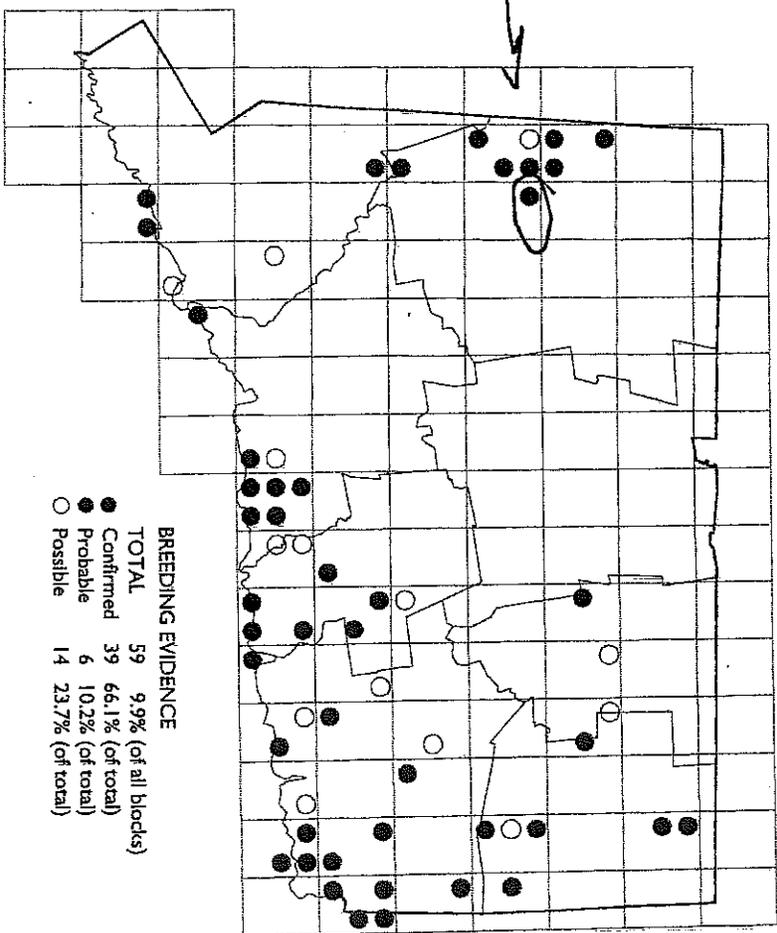
George A. Clark, Jr.

Purple Martin
Progne subis

SJE A+B

The Purple Martin is an uncommon and local migratory breeder in Connecticut, where it is now designated as a Species of Special Concern. As a migrant, it frequents open areas. Martins may be seen with other migrant swallows, but in general the species tends to move in small groups of its own. Never common, it is usually found in close proximity to a nesting site. During fall, aggregations of adults and young numbering in the hundreds have been recorded. The species migrates through Middle America, mainly coastally, and winters in the Amazon Basin south to southeastern Brazil (AOU 1983).

Habitat—Purple Martins are found in both suburban and rural situations in the state. There is a marked preference for the shoreline and the nearby interior. They feed over extensive open areas and favor sites with large bodies of



water nearby. Although formerly nesting in hollow trees and cliff face crevices, such as are still used in the West, within Connecticut martins are entirely dependent on nest boxes. Much time has been spent studying the nest site preference of the Purple Martin as many people wish to entice them to their yard. A few things seem to be necessary to attract martins: 1) exten-

sive open areas over which they can feed; 2) a cleared area for some distance around the nesting box, known as a swoop zone; 3) nearby open water. Other factors as yet unclear seem to influence acceptance of a site. Some nest boxes placed in seemingly ideal locations have gone unused for years. In contrast, sites seemingly lacking all the key features are sometimes used.

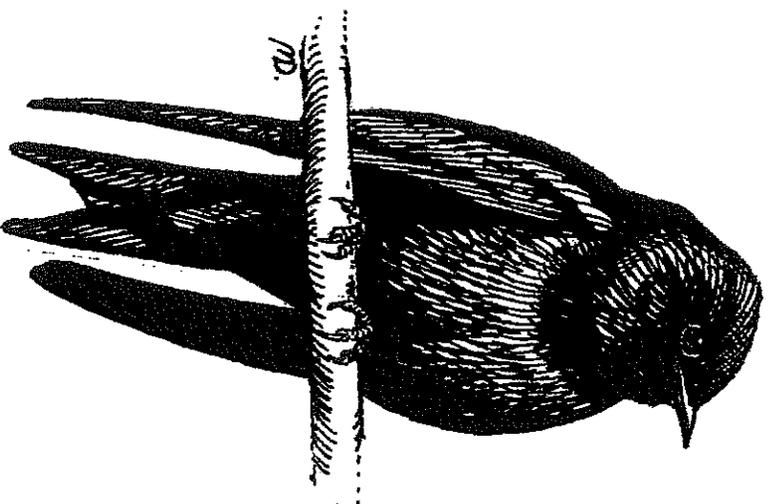
Since many houses are erected with the intent of establishing an avian pest control system, it should be noted that stomach content analysis (R. F. Johnston 1967) shows them not to eat as many mosquitoes as had been thought. Beetles and flies are much more important in their overall diet.

Atlas results—Thirty-nine blocks had confirmed breeding, including a coastal concentration and a cluster along the upper Housatonic River valley. Scattered sites to the interior, especially in the eastern portion, are in direct relation to larger bodies of water.

Discussion—As with other swallows that have benefited from human clearing of the state, the Purple Martin also has shown ups and downs with the changes in vegetation. Originally they might have used tree nesting cavities, but as the land was cleared and as people erected nesting boxes, the fortunes of martins increased. Merriam (1877)

listed the Purple Martin as locally abundant, undoubtedly in reference to colonies. By the late 1800s and early 1900s, the Purple Martin had sharply declined and was certainly feeling the impact of the rapid increase of both the House Sparrow and the European Starling, both of which use many of the available nest sites (Bagg and Eliot 1937). By the 1920s, the populations were reduced to only limited spots (Forbush 1927). Throughout this history, the most used nesting locations have been coastal, and this remains so to the present.

Always known for fluctuations in their populations, based on factors including bad weather and parasites (Moss and Camin 1970), the Purple Martin still has an uncertain fate in the state. With numerous houses being erected, a year of high return populations from the south may see new colonies established in many areas. But, as shown in the past, these new colonies can disappear just as quickly



as they appear, and for seemingly unknown reasons. Build-up of external parasite populations in nesting sites would be expected to promote frequent shifts of nesting areas.

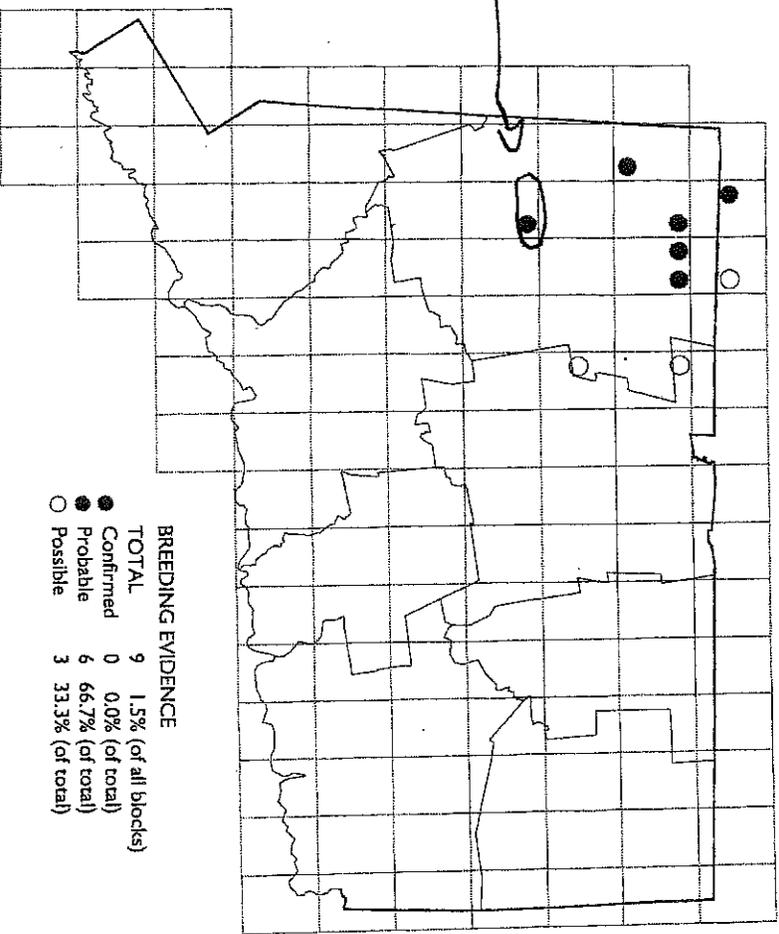
Noble S. Proctor

Common Raven
CORVUS CORAX

State A+B

The Common Raven is a scarce, but increasing, resident breeder that has colonized southern New England in the past twenty years. In eastern North America, the Raven is resident from the Maritime provinces of Canada (where common), the Adirondack Mountains of New York, and south sparingly throughout the higher portions of the Appalachian Mountains from Pennsylvania to northern Georgia (AOU 1983). It is designated as a Species of Special Concern in the state.

Habitat—Breeders are found in mountainous or hilly terrain with rocky outcroppings and cliff faces within primarily coniferous or mixed deciduous woodlands. In Connecticut, nesting has occurred in relatively undisturbed areas with restricted public access. Rock ledges with a protective overhang have been the only nest sites used, although



the species also nests in coniferous trees and has done so recently in Massachusetts. The bulky stick nest is often reused over several years.

Atlas results—Common Ravens were observed exhibiting apparent courtship behavior at several localities in Litchfield County during spring and early summer in the last years of the

atlas survey. An account of three grown and flying young on Canaan Mountain, Canaan, 22 June 1986, involved a second-hand report and, unfortunately, lacked a descriptive account required for inclusion in this atlas (Varza and Rosgen 1987). If the identification was correct, the possibility that the birds came from a nest in Massachusetts was not eliminated.



Discussion—The Common

Raven only recently began nesting in Connecticut and was only a casual visitor in the past (Sage et al. 1913). Ravens might once have been resident in Connecticut as Bull (1974) and Forbush (1927) have inferred that the species was a widespread breeder in New York and Massachusetts at least until the time of European settlement in the 1600s. Recent excavations in New York indicate that ravens inhabited that state as long as 9,500 years ago (Peterson *in* Andrie and Carroll 1988). The recent range expansion was first noted along coastal Maine during the 1940s (Griscom and Snyder 1955). The species spread westward in the 1960s to Vermont (Oatman *in* Laughlin and Kibbe 1985), and the first confirmed nesting in Massachusetts was in 1982 at Quabbin Reservoir (W. J. Davis 1989). Ravens have increased in that state dramatically since then. Late fall and winter reports in Connecticut began in the late 1970s, primarily in the northwest-

ern portion of the state (Baptist 1991). Breeding was first suspected in the state in 1986 at Canaan Mountain, but surprisingly, the first nest for the state was found in northeastern Connecticut. Two young were photographed in a nest at Boston Hollow, Ashford, in 1988 (photograph at CTMNH). Nesting was suspected here in 1987. Litchfield County remains the center of the raven's distribution in Connecticut, however. In 1987, nest construction was reported on Red Mountain, Sharon, and three young were fledged there in

both 1988 and 1989; four young fledged there in 1990 (*vide* John McNeely). In 1989, nesting occurred on rock ledges at Barkhamsted Reservoir where eleven young fledged from three nests; in 1990, those nests fledged 8 young (D. Rosgen, pers. comm.). Numerous sightings during May and June in recent years in Kent, Cornwall, Canaan, Thomaston, and several other towns in the northwest suggest a continued increase in Connecticut.

Louis R. Bevier

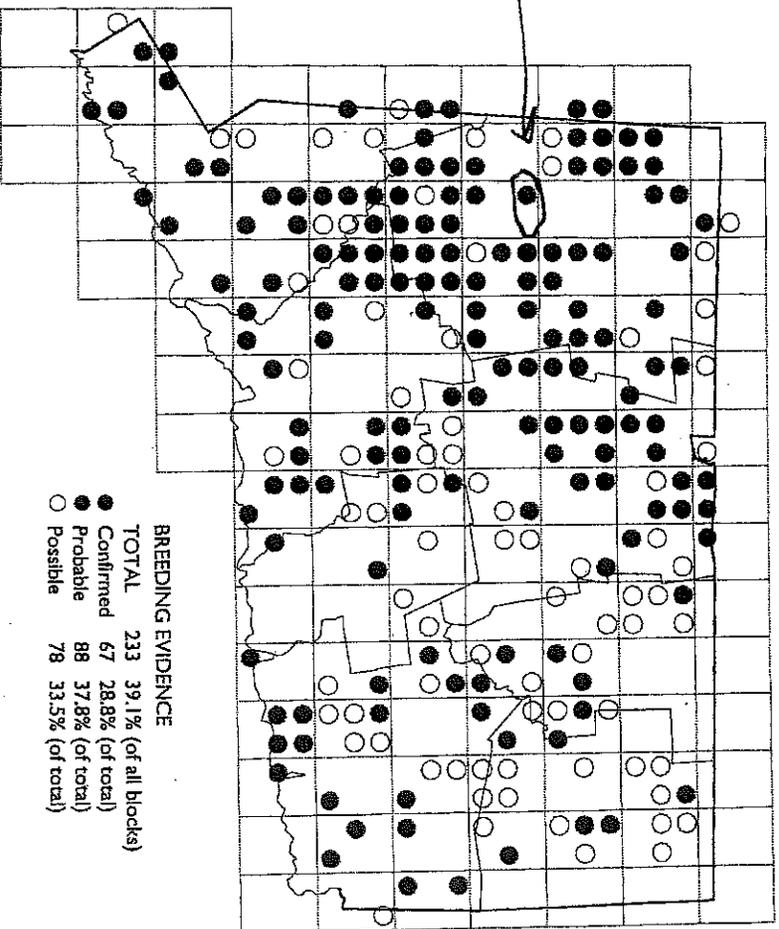
Eastern Meadowlark
Sturnella magna

ZERANSKI + BAPTIST

The Eastern Meadowlark is a grassland specialist that was once an abundant breeding bird in Connecticut, but is now restricted to widely scattered sites with suitable habitat (Zeranski and Baptist 1990). Breeding Bird Surveys indicate that the Eastern Meadowlark population decreased at a rate of 10% per year between 1966 and 1989. Given this extremely rapid rate of decline, this species should receive special attention. In winter, the Eastern Meadowlark withdraws, for the most part, to the south of Connecticut. Depending on the severity of the winter, it can be uncommon in the state, especially in salt marshes and other open habitats along the coast (Zeranski and Baptist 1990). Of about six recognized subspecies, *S. m. magna* breeds in Connecticut (AOU 1957).

Habitat—The Eastern Meadowlark is typically found in large, grassy fields with elevated singing perches, such as fence posts or isolated trees (Wiens 1969). Compared to other species of grassland birds, the Eastern Meadowlark nests in a wider range of grass cover and vegetation density (Wiens 1969, Whitmore and Hall 1978). In Illinois and Michigan, the Eastern Meadowlark was most abundant and frequent in grass-dominated

habitats such as hayfields and pastures, and it was less common in habitats dominated by broad-leaved forbs, such as old fields (Roseberry and Klimstra 1970, Granlund in Brewer et al. 1991); the species shows a similar preference in Connecticut. Nesting occurred in grassland with a dense mat of dead grass on the ground and little woody vegetation. Herkert (1991) detected



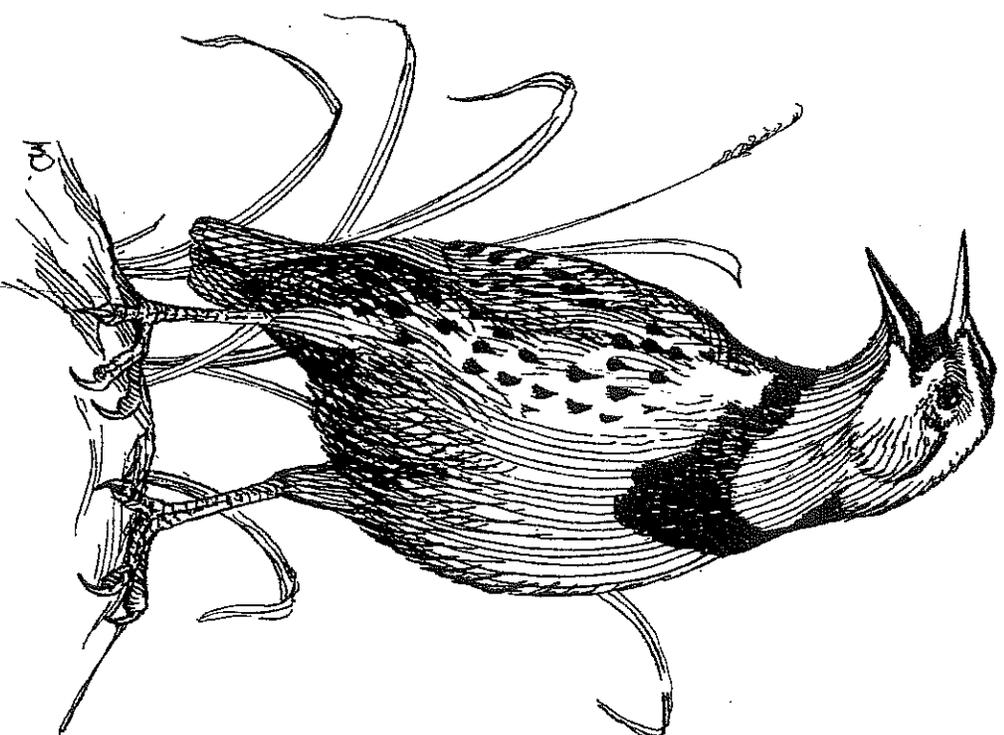
Eastern Meadowlarks in small, isolated patches of grassland (< 25 acres) during the breeding season, so apparently the Eastern Meadowlark does not require large tracts of habitat.

Atlas results—Even though the Eastern Meadowlark has become less common, it is still widely but somewhat thinly distributed in Connecticut in suitable habitat. The prevalence of confirmations in the western half of the state may reflect the greater concentration of observer effort in that region rather than the actual distribution of abundance of Eastern Meadowlarks in the state.

Discussion—This species thrived when much of Connecticut was farmland and pasture, but it declined as farming was abandoned in most areas in the state. Also, mowing of hayfields during the nesting season can cause heavy mortality of the eggs and young (Roseberry and Klimstra 1970), so the shift to earlier mowing during the summer has proba-

bly contributed to the decline of this species (Zeranski and Baptist 1990). Interestingly, at the northeastern extreme of the Eastern Meadowlark's range, the species has increased slightly and expanded its range. For example, meadowlarks were rarely recorded in Nova Scotia in the nineteenth century but are found regularly now, both in summer and winter (Tufts 1986). Extensive meadows remain in the low-lying coastal areas of this province.

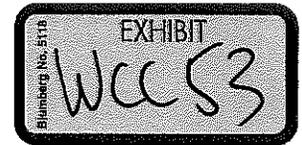
The very similar appearing Western Meadowlark (*S. neglecta*) has bred within twenty miles of Connecticut in Dutchess County, New York (male Western mated to female Eastern; Bull 1974), and yet



has never definitely been recorded in our state.

Robert A. Askins

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Commentary

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HEIGHT, GUY WIRES, AND STEADY-BURNING LIGHTS INCREASE HAZARD OF COMMUNICATION TOWERS TO NOCTURNAL MIGRANTS: A REVIEW AND META-ANALYSIS

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COMMUNICATION TOWERS IN North America kill millions of birds annually, and most of these are Neotropical species that migrate at night (Banks 1979, Shire et al. 2000). Estimates of total annual mortality in the United States are about 4–5 million to an order of magnitude greater (U.S. Fish and Wildlife Service [USFWS] 2000, Erickson et al. 2005). In 2000, the USFWS proposed guidelines to minimize avian collisions with communication towers. In November 2006, the Federal Communications Commission (FCC) announced a “notice of proposed rulemaking” that sought input on a proposal to require changes to tower design to reduce avian mortality. Here, we review and analyze the literature on the features of towers that can be regulated, particularly tower design and placement, to provide a scientific basis for regulation of tower construction and operation. We prepared an earlier version of this review (Longcore et al. 2005) for the American Bird Conservancy and other conservation groups in response to a “notice of inquiry” issued by the FCC in 2003 to gather information on collisions between birds and communication towers.

The ornithological literature contains frequent reports of birds killed at lights (see references in Weir 1976, Avery et al. 1980, Kerlinger 2000, Gauthreaux and Belser 2006). Two long-term studies with periodic searches confirmed that large numbers of birds can be killed at communication towers: (1) a 38-year study of a single 305-m television tower in west central Wisconsin documented 121,560 birds of 123 species killed (Kemper 1996), and (2) a 29-year study at a Florida television tower documented the deaths of 44,007 birds of 186 species (Crawford and Engstrom 2001). Because the FCC does not require monitoring of avian mortality at towers that it registers or otherwise approves, and because tower operators do not monitor mortality, bird kills reported in the literature represent only a minimum measurement of total mortal-

ity. Most sites are never visited to find dead birds, and most of those that are surveyed are visited only sporadically. Despite a number of useful reviews of the topic (Weir 1976, Avery et al. 1980, Trapp 1998, Kerlinger 2000) and recent progress on key issues such as the influence of lighting type and tower height (e.g., Jones and Francis 2003, Gauthreaux and Belser 2006, Gehring et al. unpubl. data), an analytical synthesis of factors influencing avian mortality at towers would aid policy development and focus future research. Here, we ask how design and placement of towers affect mortality of birds. Many variables influence rates of bird mortality at communication towers; certain types of weather conditions (e.g., frontal systems) are implicated in most large kills (see review in Gauthreaux and Belser 2006). Inclement weather and other physical variables, such as the effects of the lunar cycle, are beyond the control of regulators. Therefore, we concentrate on the elements of tower design that can influence bird mortality and that can be regulated.

METHODS

For each of the design features that influence mortality rates of migratory birds at communication towers (height, lighting, guy wires, and topographic position), we reviewed the published scientific literature and unpublished reports and consulted extensive bibliographies (Weir 1976, Avery et al. 1980, Trapp 1998, Kerlinger 2000). We conducted a meta-analysis of studies of bird kills at towers to investigate the influence of tower height and guy wires on bird mortality. Meta-analysis pools the results of many studies to detect relations that may be equivocal or contradictory in individual studies (Gates 2002). We included studies that met the following criteria: (1) methodology was clearly explained, (2) surveys around a tower were completed consistently through more than one fall

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season with >10 visits (i.e., at least fall and spring, or two falls), (3) tower height was provided, and (4) total number of birds killed was provided. To calculate annual mortality, we assumed that fall surveys constituted 75% of a year and that spring surveys constituted 25% (Crawford and Engstrom 2001). For each study or set of studies at the same location, we recorded mean annual mortality (total kill divided by number of years), the number of years of the study, tower height (m), and the presence and number of sets of guy wires and the presence and type of lighting if provided. When a study was done at a single location with towers of different heights, we recorded them separately. The effects of observer bias and predator removal were incorporated in some, but not all, studies, so we used unadjusted numbers for all towers. We transformed mean annual mortality ($\ln[x + 1]$) and tower height ($\ln[x]$) to normalize distributions and performed linear regressions with \ln tower height and number of sets of guy wires as the explanatory variables. We also entered these variables sequentially into a multiple regression to identify any unique influence of either variable.

RESULTS AND DISCUSSION

Tower height.—Overall, avian mortality increased with tower height. One comparative study addressed the effect of tower height on bird mortality. Karlsson (1977) sent a survey on bird mortality to operators at all 400 towers in Sweden and received 250 responses. All towers <150 m tall had continuously illuminated red lights, whereas taller towers, which ranged up to 325 m, had an additional flashing white light at the top. Tower personnel based their responses on incidental observations, without any systematic surveys. The proportion of towers at which personnel reported bird mortality increased from 4% at towers <100 m tall to 68% at towers 300–325 m tall (Karlsson 1977). A second comparative study, in Michigan, documented far greater avian mortality at towers >305 m tall than at shorter towers (116–146 m; J. Gehring et al. unpubl. data).

At a single site, Crawford and Engstrom (2001) reported decreased mortality following the reduction of a 308-m tower to 90 m. Kemper (1996) surveyed a 152-m tower for several years without recording bird mortality but immediately observed large mortality events when the shorter tower was replaced with a 305-m tower. Furthermore, in instances where a taller tower had been erected next to a shorter one, more birds began to be killed at the shorter tower than before (Stoddard and Norris 1967, Hoskin 1975), presumably because of the effect of lights on the taller tower.

We found no reports of instances where avian mortality decreased when a taller tower replaced a shorter tower or where avian mortality increased when a shorter tower replaced a taller tower. This is logical: taller towers have more surface area and, usually, more guy wires with which birds may collide. Furthermore, most migrants fly at 200–750 m (Able 1970, Bellrose 1971, Mabee et al. 2006). Mabee and Cooper (2004) found 26–46% of total migrants, depending on the season and location, in the strata up to ~396 m (although the strength of their radar may have underestimated the number of birds at higher altitude). They found that only 2–15% of migrants flew below 91 m during clear weather (Mabee and Cooper 2004). Therefore, all other variables being equal, substantially more birds will encounter taller towers and their guy wires than shorter towers, which may not require any or as many guy wires.

For our meta-analysis, 26 towers in 14 states in the eastern United States met our criteria for inclusion (Table 1). The linear regression of \ln -transformed mean annual mortality by tower height was significant ($F = 68.7$, $df = 1$ and 24 , $r^2 = 0.74$, $P < 0.0001$; Fig. 1A). The effects of tower height are amplified by lighting, so the lower mortality at shorter towers that do not require lighting, such as the two <60-m towers in the analysis, is likely to be partly attributable to the absence of lighting. It is impossible, however, to investigate the effects of height completely independent of lighting, because all towers >61 m tall require some form of obstruction lighting approved by the Federal Aviation Administration (FAA). To investigate the influence of height for the remainder of the data set, we omitted the two shorter towers and still obtained a significant, but weaker, relationship with a similar slope ($F = 17.8$, $df = 1$ and 22 , $r^2 = 0.44$, $P < 0.0004$; Fig. 1B). This result is not surprising; we expected few fatalities at short towers, but at taller towers the influence of other variables is likely to confound the influence of height.

Our meta-analysis has a possible bias because of the tendency for researchers to report only data that show a positive result

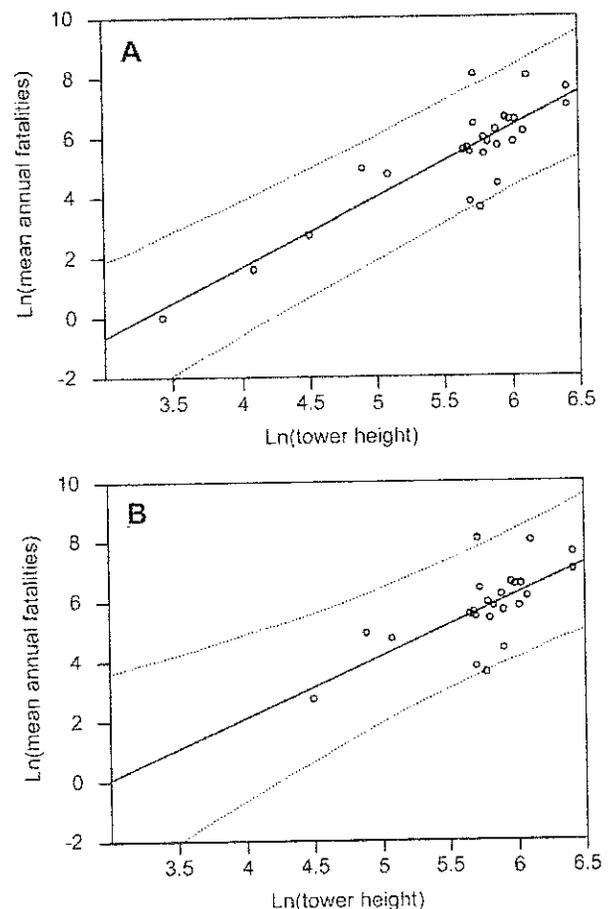


FIG. 1. Linear regression of \ln -transformed mean annual avian mortality by \ln -transformed tower height (m): (A) including all data points and (B) omitting two towers ≤ 60 m tall. Linear regression shown with 95% confidence intervals for individual values.

TABLE 1. Studies of birds killed at towers that provided estimates of annual mortality. No counts were adjusted for observer bias or scavenger removal except the shorter (90-m) tower reported by Crawford and Engstrom (2001), which had a predator-control program in place. See text for the method of calculating duration.

| State | Tower height (m) | Sets of guy wires | Duration of study (years) | Mean annual mortality | Source |
|----------------|------------------|-------------------|---------------------------|-----------------------|--|
| Kansas | 30.5 | Unknown | 1 | 0 | Young et al. 2000 |
| Tennessee | 60 | Unknown | 4 | 4 | Nicholson et al. 2005 |
| Florida | 90 | Unknown | 1.5 | 14 | Crawford and Engstrom 2001 |
| New Hampshire | 133 | 1 | 2 | 134 | Sawyer 1961 |
| West Virginia | 161 | Unknown | 6 | 116 | Herron 1997 |
| Tennessee | 287 | 4 | 19.75 | 253 | Laskey 1960, 1962, 1963a, b, 1964, 1967, 1968, 1969a, b, 1971; Goodpasture 1974a, b, 1975, 1976, 1984, 1986; Bierly 1973 |
| New York | 293 | 5 | 30 | 267 | Morris et al. 2003 |
| Iowa | 299 | 3 | 2 | 243 | Brewer and Ellis 1958 |
| Michigan | 300 | Unknown | 4.5 | 44 | Caldwell and Wallace 1966 |
| Wisconsin | 305 | 4 | 38 | 3,198 | Kemper 1996 |
| Florida | 308 | Unknown | 13 | 618 | Crawford and Engstrom 2001 |
| New York | 323 | 2 | 30 | 35 | Morris et al. 2003 |
| New York | 328 | 6 | 30 | 370 | Morris et al. 2003 |
| Ohio | 330 | 3 | 19 | 227 | Morris et al. 2003 |
| Michigan | 342 | Unknown | 5.25 | 331 | Caldwell and Wallace 1966 |
| North Carolina | 362 | 7 | 2 | 498 | Carter and Parnell 1976, 1978 |
| North Dakota | 366 | 5 | 2 | 282 | Avery and Clement 1972, Avery et al. 1977 |
| Kansas | 366 | 4 | 1.5 | 83 | Boso 1965 |
| Michigan | 390 | Unknown | 5.25 | 757 | Caldwell and Wallace 1966 |
| Minnesota | 400 | 5 | 5 | 701 | Strnad 1962, 1975 |
| Massachusetts | 411 | 6 | 1.5 | 338 | Baird 1970, 1971 |
| Tennessee | 417 | 6 | 29.75 | 689 | Nehring and Bivens 1999 |
| Kansas | 439 | 9 | 2 | 473 | Young and Robbins 2001 |
| Florida | 452 | 6 | 3 | 3,043 | Taylor and Anderson 1973, 1974 |
| North Carolina | 608 | 9 | 2 | 1,111 | Carter and Parnell 1976, 1978 |
| Iowa | 610 | 5 | 1.75 | 2,012 | Mosman 1975 |

(Rosenthal 1979). Studies that detected no avian mortality at tall towers that were searched many times may be tucked in file drawers and never published. This type of bias is well recognized as a potential failing of meta-analysis (Gates 2002). For those towers where mortality has been reported, however, it seems that a consistent relationship exists between height and avian mortality.

Guy wires.—Most towers from which large bird kills have been reported have guy wires (but see Gregory 1975). Observational studies of birds in the vicinity of towers revealed that birds are much more likely to collide with the guy wires than with the tower itself (Brewer and Ellis 1958, Fisher 1966, Avery et al. 1976). Greater mortality caused by guyed towers would be expected because of the circling behavior exhibited by migrants under the influence of lights on towers (Gauthreaux and Belser 2006). In a study of bird mortality at transmission towers in Wisconsin, Kruse (1996) found that locations of dead birds and of guy wires were highly correlated, implicating collisions with guy wires as the cause of death. Weise (1971) searched three towers near Milwaukee daily from 1965 to 1970. Although each tower was 305 m tall, the tower with no guy wires killed “very few” birds, whereas two nearby towers with guy wires killed more birds in frequent small kills and in occasional kills of 300–500 birds in a night. Finally, J. Gehring et al. (unpubl. data) found dramatically lower

mortality at freestanding towers than at guyed towers of the same height (116–146 m).

Wind power producers also have investigated the hazard of guy wires to migrating birds. Research on unguyed wind turbines and nearby guyed structures has confirmed the increased risk of guyed structures. For example, the average number of birds killed at a guyed meteorological tower was ~3× greater than the average rate of mortality at nearby turbines of a similar height without guy wires (Young et al. 2003).

In our meta-analysis, 18 studies reported the number of sets of guy wires. For other studies, the number was not stated, but no studies included towers without guy wires. Annual mortality was significantly predicted by the number of sets of guy wires ($F = 5.4$, $df = 1$ and 15 , $r^2 = 0.25$, $P < 0.03$). In a multiple regression for this subset of studies, neither tower height nor number of sets of guy wires explains remaining variation when the other variable is entered first because of the collinearity of tower height and number of sets of guy wires (Pearson's correlation coefficient; $r = 0.69$, $P < 0.001$). Some towers have many sets of guy wires for their height (e.g., nine sets on a 439-m tower) or few sets for their height (e.g., five sets on a 610-m tower), but more studies would be needed to further specify any independent contributions of tower height and number of sets of guy wires.

Tower lighting.—The lighting scheme of communication towers is probably the most important factor contributing to bird kills at towers that can be controlled by humans (Cochran and Graber 1958, Avery et al. 1976, Gauthreaux and Belser 2006). Current federal regulations dictate the use of lighting for nighttime conspicuity for aviation safety on all obstructions ≥ 61 m tall and for structures within 5.6 km of an airport (FAA 2007). The only purpose in placing lights on communication towers and other structures is to provide for aviation safety by ensuring that pilots can see human-made obstructions.

Nocturnal migrants aggregate at lights when they have become disoriented or "trapped" by the lights after entering their zone of influence. This zone increases when fog is present in the air to reflect the light and when inclement weather or topographic factors force migrating birds to fly at lower altitudes. These mechanisms have been observed not only near communication towers but also near lightships, lighthouses, fires, oil flares, ceilometers, and city lights and lighted buildings (see references in Gauthreaux and Belser 2006, Montevecchi 2006).

Historical accounts suggest that, at least for birds attracted to lighthouses, continuously illuminated white lights are more attractive to birds than colored or flashing lights. Barrington (1900) analyzed birds that were killed at 58 lighthouses and concluded that continuously illuminated lights were more attractive to migrants than blinking lights and that white lights were more attractive than red lights. Others have concluded that "fixed white lights are also more deadly than the revolving or coloured lights" (Dixon 1892:175) and that "coloured lights do not attract the birds as white ones so fatally do" (Thomson 1926:333). These observations are relevant to communication towers because, despite differences in height and lighting type, similar species are killed at lighthouses (see Allen 1880, Brewster 1886, Munro 1924, Lewis 1927) and communication towers (see Shire et al. 2000). Furthermore, the many anecdotal accounts of bird aggregations at lighthouses share common features of species composition and bird behavior with descriptions of bird aggregations at towers.

Duration of lighting is critical to whether birds are attracted to lights. The Dungeness Lighthouse in Kent, England, was well known for chronic bird kills. In 1961, its revolving beam was replaced with a bluish-white lamp that produced a 1-s flash every 10 s. A revolving beam causes the area around a light to be continuously illuminated, especially in foggy weather, even though the spot of the beam sweeps the horizon. At Dungeness, this continuous illumination was eliminated with the change to a flashing light. Observations during the transition week between lights, under similar weather conditions, showed bird aggregation with the constant revolving light but none with the intermittent light (Baldwin 1965). Reducing the intensity and breadth of a revolving beam was shown by Jones and Francis (2003) to dramatically reduce the number of avian mortalities at the Long Point Lighthouse on Lake Erie in Ontario.

Some U.S. television towers were equipped with white strobe lights (e.g., L-865) instead of steady-burning red (L-810) and flashing red (L-864) lights for the first time in 1973 (Avery et al. 1976). Only one of the large one-night kills reported in the literature since then occurred at a tower with strobe lights. A witness to the aftermath of this notorious incident, when $>10,000$ Lapland Longspurs (*Calcarius lapponicus*) died in one night, considers the cause to

have been whiteout snow conditions and lighting at facilities at ground level, not the tower lighting (E. A. Young pers. comm.).

Bird mortality was reduced substantially when lighting of a tower in Orlando, Florida, was changed from steady-burning red and flashing red lights to white strobe lights (W. Taylor pers. comm.). The tower was the site of large bird kills, and Taylor and colleagues had collected $>10,000$ birds over the years (Taylor and Anderson 1973, 1974). In 1974, the ~ 305 -m guyed tower blew down and was replaced with a taller guyed tower with white strobe lights. Following the replacement, bird mortality was reduced drastically and no mass kills (i.e., >100 birds) were ever again reported at the site (Taylor 1981), despite many return visits following weather conditions previously associated with mortality events (W. Taylor pers. comm.).

Gauthreaux and Belser (2006) investigated the influence of lighting type on behavior of nocturnal migrants through direct observation at towers with different lighting schemes in Georgia and South Carolina. They found that although towers lit by white strobe lights can affect the path of birds during migration, no greater number of birds accumulated around them than at control sites. Furthermore, significantly more nonlinear flights per minute were seen at towers with red flashing and steady-burning lights than at control areas or towers with white strobe lights. These results suggest that although white strobe lights can cause birds to take more nonlinear flight paths, they do not result in birds accumulating around the tower. Gauthreaux and Belser (2006) concluded that the significantly greater number of paths per minute around the tower with red lights resulted from the attraction of the lights, added to the influence of the lights on orientation, leading to accumulations of individuals near the towers with steady-burning red and flashing red lights (see also Graber and Cochran 1960, Avery et al. 1976).

The evidence indicates that use of strobe or flashing lights on towers results in less bird aggregation and, by extension, lower bird mortality, than use of steady-burning lights. Indeed, the use of strobe lights has been recommended by a series of researchers investigating this topic. Verheijen (1985:13) concluded that "success has been achieved in the protection of nocturnal migrant birds through interrupting the trapping stimulus situation by . . . replacing the stationary warning lights on tall obstacles by lights of strobe or flashing type." Jones and Francis (2003) similarly concluded that strobe lights with a complete break between flashes would reduce bird mortality at tall structures.

The report by Evans et al. (2007) also supports the conclusion that flashing lights with a dark phase have less effect on birds than solid lights. In an experimental comparison, Evans et al. (2007) reported more calls of migrating birds around white, blue, and green steady-burning lights installed at ground level than during control periods or around flashing lights or red steady-burning lights. Although Evans et al. (2007) presented convincing evidence that some wavelengths of continuous light influence the rate of calling in birds, further inference is limited because control sites were distant (107 km) and the relationship between calls and abundance is not well established. Data from Cochran and Graber (1958) showed a negative correlation between birds seen per minute and calls heard per minute (our analysis, Pearson's correlation coefficient, $r = -0.71$; $n = 16$ sampling periods ranging from 2 to 10 min). Farnsworth et al. (2004) found that hour-to-hour variation in calling

rate of migrating birds was only weakly explained by hour-to-hour density of migrating birds measured by weather surveillance radar only 60 km from the study sites in South Carolina and New York. The failure of red steady-burning lights to result in additional calls of migrants in the unique experimental situation presented by Evans et al. (2007) does not weaken the repeated observation that such lights cause aggregations when installed on towers.

Researchers analyzing bird kills at wind turbines have observed that red strobe-type lights do not attract night-migrating birds (P. Kerlinger et al. unpubl. data). Furthermore, Gehring et al. (unpubl. data) compared mortality of birds at towers with red strobe, red flashing, and white strobe lights and found that all three configurations resulted in less mortality than towers with steady-burning lights. From these studies, and the repeated identification of the importance of a dark phase for minimizing avian mortality, we conclude that removal of steady-burning lights and use of only synchronously flashing lights would reduce avian mortality at communication towers.

To reduce avian mortality, it is also important that accessory structures at towers not have constant exterior lighting. Studies at wind turbines reveal greater bird kills at turbines near lighted structures (P. Kerlinger et al. unpubl. data). Avoidance of lights on accessory structures for towers in natural areas would also reduce adverse effects on other taxa (Longcore and Rich 2004, Rich and Longcore 2006).

Topography.—Topography is known to concentrate migrants in certain locations (i.e., coastlines, mountain ridges, rivers, and hills). Considerable evidence of this effect has been gathered in Europe (Eastwood 1967, Bruderer and Jenni 1988, Bruderer 1999), with fewer studies in North America (Williams et al. 2001). Results of Williams et al.'s (2001) study in New Hampshire revealed the effect of the topography of the Appalachian Mountains on migratory birds, including Neotropical migrants traversing southeast over the mountain chain. At two ridgeline sites, the researchers observed "exceptional numbers of migrants at 2 to 30 m AGL [Above Ground Level]" (Williams et al. 2001:394). They concluded, in agreement with the European studies, that it should not be assumed that birds migrate in a broad front across mountains. Indeed, they described situations that resulted in large numbers of birds concentrated near crests of ridges and in passes. Although studies with weather surveillance radar provide evidence for broad-front migration (Gauthreaux and Belser 2003), such studies usually detect migrants flying at relatively greater heights. Consequently, low-flying migrants are often missed by weather surveillance radar and, because of their proximity to the ground, are more likely influenced by local topography. However, Mabee et al. (2006) found that very few birds changed their behavior in response to ridgelines in a study along the Allegheny Front in West Virginia. This is not inconsistent with the observations of Williams et al. (2001) but suggests that large numbers of birds are not found at crests of all ridges.

These studies provide evidence that placement of communication towers along ridgelines may result in higher bird mortality than at other locations. Birds can be killed at a tower whenever large numbers are flying near it at the same elevation as the tower. This can occur because the tower is tall or because it is placed topographically where birds are concentrated close to the ground. At ridgeline locations, inclement weather is not

required for concentrations of birds to be found at low elevation (Williams et al. 2001). Radar studies can be conducted before siting a tower in an area that may concentrate night migrants so that the tower can be located to avoid such sites (e.g., Mabee and Cooper 2004, Mabee et al. 2006).

Policy implications.—Enough reliable information is available to implement communication tower guidelines that would reduce existing and future significant adverse effects on birds. Although additional research would be useful, avian mortality would be reduced by restricting the height of towers, avoiding guy wires, using only red or white strobe-type lights as obstruction lighting, and avoiding ridgelines for tower sites. These recommendations are included in current guidelines established by the USFWS (2000), and implementing them within an adaptive management approach is advisable (Holling 1978, Walters 1986, Haney and Power 1996). Adaptive management allows for a management action to be taken—such as requiring only strobe-type lights on all towers or requiring that towers be constructed without, or with fewer, guy wires—while continuing to increase scientific knowledge by studying the effects of such actions. Future recommendations may be modified to incorporate the findings of such studies. Many alternative mitigation strategies could be investigated and eventually adopted under an adaptive management approach, but immediate action based on current knowledge is needed to reduce adverse effects of communication towers on birds.

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Washington Environmental Council

PO BOX 283 – WASHINGTON DEPOT, CT 06794



May 11, 20090

Mr. Daniel Caruso
Chairman
Connecticut Siting Council
Ten Franklin Square
New Britain, CT 06051

RE: Docket No. 378 – SBA Towers II, LLC, Application for a Certificate of Environmental Compatibility and Public Need.

Dear Sir:

The Washington Environmental Council (WEC) has been monitoring the referenced application since September of last year. We have become increasingly alarmed with the alternate sites proposed on the Tanner Farm Property on Rabbit Hill Rd., Warren, CT, for the construction of a single "state of the art" Cell Tower.

The first site selected would clearly violate the terms and conditions of the purchase by the State of Connecticut of the development rights to that section of the property. We believe that the Siting Council's approval of that site would set an extremely dangerous precedent. It would result in all properties where the development rights have been purchased by the State of Connecticut being put in play, not just for use by Cell Tower operators, but possibly for other commercial activities that are not permitted under Connecticut Chapter 422a – Agricultural Lands. A close reading of Secs. 22-26aa through Sec. 22-26cc of that Chapter, reveals in detail the permitted uses under a purchase of development rights by the State of Connecticut. It is clear that commercial Cell Towers are not amongst the permitted uses of such land.

With respect to the second site, WEC's Mission since its creation in 1971 has been:

"The Council is dedicated to being an advocate and providing leadership in maintaining, protecting and enhancing the environmental quality of the Town of Washington and the surrounding region."

The adverse environmental impact that a Cell Tower would have on what is one of the regions most scenic and environmentally sensitive natural resources is incalculable. As an example, the Cell Tower would be sited within fifty feet from the springs and wetlands that are the headwaters of Bee Brook, an important tributary of the Shepaug River. We fear that Bee Brook's whole ecosystem would be adversely impacted over time and, ultimately, the Shepaug River would also be affected in a negative way.

The scenic blight the Cell Tower would create would be unprecedented. It is proposed that the Cell Tower be sited directly on the ridge line. At a height of at least 150 feet and possibly going to 200 feet or more, its towering presence would be seen from many vantage points. Of special concern is the fact that it will be readily seen from the surrounding designated scenic roads and from the fields and trails of the Macricostas Preserve that is used actively by many people for recreational purposes. All the energy, effort and money that have been expended to make Macricostas a beautiful 256 acre Preserve would have been for naught. This includes the \$500,000. grant from the State of Connecticut under its Open Space and Watershed Land Acquisition Grant Program that made the acquisition of this property possible so it would be maintained as open space in perpetuity.

As stated earlier, we understand that this is a "state of the art" Cell tower that has a capability for new technologies that go far beyond just providing simple cell phone service. WEC was an intervenor in the Sempra Energy Power Plant application that came before the Siting Council a few years ago to build a power plant in New Milford, CT. Sempra too had a "state of the art" power plant. The Siting Council by unanimous vote denied the Sempra Application for a variety of environmental problems that emanated from one critical flaw in the application, namely, the location of the plant. WEC feels strongly that location is also a major flaw in the Docket No. 378 application. The location on either of the two sites proposed for a "state of the art" Cell Tower located in either Chapter 422a developments rights protected farmland or on a ridge line and towering at 150 feet to 200 feet and possibly more over one of the most scenic and environmentally sensitive natural resources we have in the area just should not happen.

WEC respectfully submits that the Application for Docket No. 378 should be denied by the Siting Council for the reasons we have cited above. We side with Governor Rell, Representative Chris Murphy, The Council on Environmental Quality, The Towns of Washington and Warren, the Washington Conservation Commission and the many others who oppose this application. The proposed Cell Tower is just in the wrong location.

We request that our letter be made part of the record of Docket No. 378 in opposition to the Application submitted therewith. If time permits, please read the letter into the record at the public hearing scheduled on May 21, 2009.

Thank you for your consideration of the points we have made in this letter.

Very truly yours,



Carlos Canal
Director

cc: The Washington Conservation Commission



Land Use Applications Before the Connecticut Siting Council: Effective Involvement by Municipal Conservation and Inland Wetlands Commissions *by S. Derek Phelps*

Municipal land use boards throughout our state are staffed with some of the finest and most committed public service volunteers anywhere. They serve countless hours investigating, studying, and researching issues that can affect the environment and quality of life of their communities. They endure some of the longest, most intensive meetings that occur in any town hall.

And without exception, every single one of these public officials wants to do the best job possible for their respective city or town.

As someone who works with a state agency that has preemptive jurisdiction over municipal authority (and as a former selectman), I consider it my duty to do everything in my power to help facilitate municipal involvement to the greatest degree possible. I also understand that perhaps the most critical tool to aid municipal involvement is the delivery of accurate and complete information to local boards, commissions, and agencies.

To that end, I welcome every opportunity to explain our role and how our agency works. So before going any further, let me first say that I appreciate this opportunity to communicate to you, the members

of Connecticut's Conservation and Inland Wetland Commissions, about the public mission and the process of the Connecticut Siting Council.

What is the Siting Council?

I'd like to first clarify that the Siting Council is an executive-branch agency of Connecticut state government. Our offices are in New Britain where we operate with ten employees and an annual operating budget of slightly more than \$2 million. Our agency is entirely self-funded in that we derive all of our revenues from the various companies that we regulate. The agency website is ct.gov/csc.

We employ five full-time siting analysts, each of whom has extensive education and experience in environmental matters. Their backgrounds include prior employment with the Department of Environmental Protection (DEP), the Department of Public Utility Control (DPUC), and municipal land use planning.

The Siting Council itself generally functions as a nine-member body comprised of seven members of the lay public and representatives of DEP and DPUC. DEP's designee is an environmental analyst with 18 years of experience.

Of the seven representatives of the public, two are appointed by the General Assembly and the remaining five are appointed by the Governor, including the Chairman. This group includes a former mayor and former members of planning and zoning and inland wetlands commissions. And they live throughout our state – from Fairfield, to Norfolk, to Stonington, and all parts in between.

Siting Council, continued on page 3

Inside

| | Pg. |
|--|-----|
| Commission News | 2 |
| Journey to the Legal Horizon | 5 |
| 31 Annual Conference News | 8 |
| Topsoil for Constructed Wetlands | 10 |
| CACIWC's Listserv | 12 |
| Coventry's Municipal Rain Garden Project | 14 |

In the simplest of terms, the scope of the Siting Council's exclusive jurisdiction is to provide siting review with respect to proposals to develop large-scale electric utility infrastructure (such as power plants, sub-stations, and high-voltage transmission lines) and specific types of telecommunications facilities including cellular telephone towers. Although seldom invoked, our jurisdiction also includes certain hazardous waste facilities and ash residue disposal areas.

The public mission of the Siting Council is to act as an independent judicial arbiter that objectively balances the statewide need for these projects, at the lowest reasonable cost to consumers, with the need to protect the environment and ecology of the state. And that's where you, as members of local municipal land use boards, come in.

Municipal Involvement

In full recognition of the critical value that local input has to issues of siting, the Connecticut legislature was careful to provide for multiple opportunities for municipalities to engage in meaningful participation and provide input to the Siting Council process.

Perhaps the most important input occurs before an application is even filed with the Siting Council, during what is often called the municipal consultation period.

State law requires that an approval (certificate) from the Siting Council must first present information about the project to the host municipality. If a project is within 2,500 feet of a neighboring municipality, the applicant must also provide project information to that municipality.

The applicant must make a good-faith effort to meet with the chief elected official (CEO). Once this is done the applicant may not file with the Siting Council until 60 days pass in order to permit the town sufficient time to study the proposal. This is where the first opportunity arises for local officials to become meaningfully engaged.

As a practical matter the CEO often refers the applicants to a key member of his or her staff; say, the

generally the applicant will be directed to meet with the various boards that will have an interest in the project based on the nature of the proposal.

It is during this time period (which again must last no less than 60 days) that local boards should fully scrutinize the proposed project. This is your time to ask questions, make suggestions, and express concerns.

Frankly, your engagement during this time is critical. By fully scrutinizing the proposal you may well cause the applicants to modify the application that is ultimately filed with the Siting Council.

The second important opportunity for municipalities to be involved in our process comes when the application is filed at the Siting Council.

"To Be (a Party) or Not to Be?"
Once an application is filed with the Siting Council, municipal participation can take one of two different forms. For the purposes of this discussion I will call them "comment only" and "party participation."

"...and serves to underscore the point that the participation of local municipal boards is more than simply invited — it's essential and crucial to our work."

Every application for a Certificate from the Siting Council involves a hearing. We hold the hearing at a suitable facility as close to the affected community as possible.

Once an application is received and a hearing is scheduled, the Siting Council Chairman sends a letter to the host municipalities' CEO alerting him or her to the hearing schedule and explaining the different ways that the municipality may become involved.

The Chairman's letter explains that the municipality may either offer comments at the public hearing or become a party to the evidentiary proceeding.

It is important to understand that with each proceeding there is both an evidentiary proceeding session and a public hearing session. (Of note, the Council's evidentiary hearing often occurs during the afternoon and the public hearing occurs during the evening of the same day.)

The evidentiary hearing functions much like a court of law. Rules of evidence apply which means that once applicants and participants present their case they must also make themselves available for cross examination. During the public hearing session persons may speak (comment only) without concern for cross examination but also may not cross examine others.

All municipalities in which projects are proposed to be sited are permitted by law to become a party (party participation). As alluded to above, being a party brings significant legal privileges and prerogatives, but also some responsibilities.

For example, the Siting Council requires that all evidence be given to the Council and all other participants, including the applicant, several days before the evidentiary hearing. Ex parte communications, whether with Council staff or Council Members, are prohibited. And such party participants are required to respond to interrogatory questions presented by other participants, according to a set schedule.

Still, there are some other factors that should be considered before a municipality chooses not to become a party. With respect to projects that involve electric transmission line proposals there is a \$25,000 municipal participation fund to assist in legal expenses. This fund may only be accessed if a municipality is a party. And in the end, if a municipality appeals a decision made by the Siting Council to Connecticut Superior Court, such appeal may be dismissed for failure to exhaust administrative remedies if they did not fully participate when the matter was before the Siting Council.

Lastly, with respect to how a municipality may participate in Siting Council proceedings, I wish to point out that there is a provision {C.G.S. Sec. 16-50x.(d)} which permits municipalities to issue an order to "regulate and restrict" certain types of electric utility infrastructure. This process has been seldom invoked but may be useful to local concerns in certain instances.

Transparency of Process

All creatures of government have a shared duty to provide for a fully transparent process. But this is especially true of agencies, such as the Siting Council, that review and deliberate upon highly-contested cases

people disappointed or unhappy.

In such circumstances, allowing for all stakeholders to see the record develop and have confidence in the integrity of the process is vital.

In today's world transparency of process often means providing for public access via an easily navigable web-based platform. We think our website achieves that goal.

We post and maintain the complete evidentiary record for every contested case proceeding on our website [ct.gov/csc]. Within our "pending proceedings" section you will see a listing of every pending case and can review its associated record of evidence. You will also see easy-to-use links that you can use to email the assigned siting analyst, and access the forms necessary to become a Party to the proceeding. You can also review the application documents and all the evidence submitted by all participants.

Other notable aspects of our website are that you can read and review every decision and order ever issued by our agency (organized both by town and docket number) and you can register for e-alerts so that you receive notice whenever we issue an agenda for a future Siting Council meeting or the minutes of a past meeting.



Summary

The Siting Council serves an important public mission, balancing the potential environmental impact of certain types of infrastructure projects with their need (or benefit) to serve statewide interests. This work is often difficult and challenging, but we do our best to gather information and input from every possible source before rendering any decision. We also make every effort to do this work in an open and transparent fashion.

I hope this short introduction to our agency is helpful to you and serves to underscore the point that the participation of local municipal boards is more than simply invited – it's essential and crucial to our work. If and when an opportunity arises for you to do so, we hope you will choose to fully participate in our process so that we may together make the best possible decisions for the betterment of our beautiful state.

S. Derek Phelps is Executive Director of the Connecticut Siting Council.

