# HABITAT MANAGEMENT FOR WILDLIFE

Dr. Craig 10/22

## PURPOSE

We will learn field procedures for managing properties with extensive thickets of alien invasive species, including methods for control of invasives and ways to introduce native and other wildlife-valuable species into the system. Associated with these management activities are bird-banding efforts that monitor the species composition of species using the thickets, adjacent hayfields and organic vegetable plots. We will also discuss some of the other management activities carried on at this field station of Bird Conservation Research, Inc.

## DESCRIPTION

Eight years ago, this 10-acre field station was a heavily overgrown farm (see *Additional Resources* #1 for some history). Since that time, it has had its plant communities actively managed for wildlife. These communities include largely alien thickets that border a ca. 8-acre hayfield that is mowed beginning in mid-July. The hayfield is principally vegetated by the non-native cool weather forage grasses Orchardgrass (*Dactylus glomerata*) and Redtop (*Agrostis gigantea*). Red Clover (*Trifolium pratense*) serves as an understory that naturally nitrifies the soil via nitrogen-fixing root nodule bacteria. The hay yield is about 1000 square bales/year. An additional one-acre hayfield is too steep for hay baling, so it is mowed only in August to suppress woody plant growth and to permit grass-nesting birds to have the opportunity to raise young. The alien thickets are largely composed of Burningbush (*Euonymus alatus*), Multiflora Rose (*Rosa multiflora*), Asiatic Amelopsis (*Amelopsis brevipedunculata*) and Oriental Bittersweet (*Celastrus orbiculata*), although significant cover by Eurasian Privet (*Ligustrum vulgare*), Common Buckthorn (*Rhamnus cathartica*), and Russian Olive (*Eleagnus angustifolia*) also occurs. In one portion of the thicket, an opening occurs where the native wetland edge-associated Reed Canary Grass (*Phalaris arundinacea*) grows. Its presence suppresses growth by most other species and represents, along with Dune Grass (*Ammophila breviligulata*) and Switchgrass (*Panicum virgatum*) communities (both associated with saline coastal environments), the only ones in Connecticut that reasonably can be called persistent native grassland. Two organic vegetable plots of 3000 $ft^2$ each are also present, with the principal crops grown being corn, tomatoes and potatoes. They have an annual yield of ca. 1000 ears, 1000 lbs. and 300 lbs., respectively. A variety of other vegetable crops are also grown in smaller amounts, with the harvest season beginning in April and lasting into early December.

## CONSIDERATIONS

As we tour the habitats, consider the following:

1. Inasmuch as New England forests have a depauperate flora due to the inability of some plant species to recolonize following the last ice age (11,000 yrs bp), and considering that most of our fauna co-evolved with forests that were more diverse, particularly in terms of large flowering species, is it reasonable to pursue a management strategy that includes re-establishing native flowering species as well as introducing some non-invasive alien flowering species to the landscape?
2. Given that landscapes dominated by invasive alien plant species can make recolonization by native species difficult, what cultural practices might give natives the opportunity to compete successfully with aliens and return a landscape to one more in tune with the needs of native wildlife?
3. Although natural New England habitats do not favor the local occurrence of breeding grassland bird species, to what extent might human-associated agricultural landscapes still provide limited breeding habitat and significant migratory pathways for such species?
4. How might encouraging the presence of a variety of wildlife species become part of an integrated pest management strategy in the burgeoning field of organic agriculture?
5. Is management of New England agricultural habitats for typically prairie-associated species a valid management goal? How might it fit into the economics of such agricultural enterprises as dairy and beef cattle farming? Keep in mind that wildlife management has historically been viewed as an agricultural discipline, with wildlife seen as an additional farm crop. For some relevant background, you can go to *Additional Resources* #2 below.

**MANAGEMENT STRATEGIES**

1. The first strategy employed involved mechanically uprooting a ca. 60 ft. wide patch of Multiflora Rose, piling up the remains and burning them. This area originally extended from the front lawn of the house to the Reed Canary Grass wetland. We then used the resulting wood ash to assist with raising the area's soil pH to assist with soil nutrient retention. Following removal, the area was mowed with a brush hog to cut down all other woody vines and growth. This permitted early successional herbs to begin colonizing the area, permitted the planting of wildlife-valuable shrub species and also permitted natural recolonization of other desirable woody species. In planting, preference was given to species with multi-season wildlife value, such as those with larger, typically insect-pollinated flowers and those that produce crops of edible fruit and seeds. Follow-up annual treatment involves March/April string trimming and hand clipping of re-growing alien species. Herbicides are not used. The goal is for native and other desirable species to become well enough established to be able to compete with and crowd out aliens. Many alien species are best at becoming established in disturbed sites but can lose their competitive advantage when confronted with a maturing native community. Indeed, some native species, including those present in the study area, are capable of aggressively competing with aliens.

   To date, the following early successional herbs are among those that have either naturally recolonized or been seeded into this site. More species have appeared each year, and many are associated with moister conditions. In addition to providing nectar and seeds for vertebrate wildlife, some also serve as hosts for predatory insects, notably Ichneumonid wasps, so they have become a significant addition to our integrated pest management protocol for our organic vegetable plots.

   Panicled Aster (*Aster simplex*)
   Small White Aster (*Aster vimineus*)
   Purple-stemmed Aster (*Aster puniceus*)
   New England Aster (*Aster novae-angliae*)
   Rough-stemmed Goldenrod (*Solidago rugosa*)
   Tall Goldenrod (*Solidago altissima*)
   New York Ironweed (*Vernonia noveboracensis*)
   Northern Willow-herb (*Epilobium glandulosum*)
   Sweet Joe Pye-weed (*Eupatorium purpureum*)
   Blue Vervain (*Verbena hastata*)
   Common Milkweed (*Asclepias syiaca*)

   Shrub and understory trees planted or recolonizing naturally include the following. Many are also associated with moister soils (* = non-native) and most have fleshy fruits that are eaten and dispersed by birds. As with some of the above herbs, some are also hosts for native butterflies.

   Nannyberry (*Viburnum lentago*)
   Northern Arrowwood (*Viburnum recognitum*)
   Pussy Willow (*Salix discolor*)
   Gray Dogwood (*Cornus racemosa*)
   Sweet Pepperbush (*Clethra alnifolia*)
   Common Serviceberry (*Amelanchier arborea*)
   Winterberry (*Ilex verticillata*)
   Spicebush (*Lindera benzoin*)
   Striped Maple (*Acer pensylvanicum*)
   Red Buckeye (*Aesculus pavia*)
   Buttonball Bush (*Cephalanthus occidentalis*)
   Red Chokeberry (*Aronia arbutifolia*)
   *Mimosa (*Albizia julibrissin*)
   *European Spindle Tree (*Euonymus europaeus*)
   *Siberian Crabapple (*Malus baccata*)

Canopy trees planted or recolonizing naturally include the following. All have flowers, seeds or fleshy fruits used by a variety of wildlife.

Shagbark Hickory (*Carya ovata*)
Scarlet Oak (*Quercus coccinea*)
Black Oak (*Quercus velutina*)
American Beech (*Fagus grandifolia*)
White Ash (*Fraxinus americana*)
Butternut (*Juglans cinerea x ailantifolia*)
Red Maple (*Acer rubrum*)
Sugar Maple (*Acer saccharum*)
Silver Maple (*Acer saccharinum*)
American Elm (*Ulmus americana*)
Northern Catalpa (*Catalpa speciosa*)
Black Cherry (*Prunus serotina*)
Bigtooth Aspen (*Populus grandidentata*)

2. A second less aggressive strategy has been employed beginning at the wetland and extending along the border of the rest of the property. Here, the woody border originally extended 60-100 ft. beyond its present boundary into what is now hayfield. Again, mechanical uprooting of invasive alien shrubs combined with chain sawing aliens to the ground reduced the alien thickets to their present ca. 30 ft. width. Furthermore, we chain-sawed trunks of vines, notably Oriental Bittersweet and Asiatic Amelopsis (although we left Poison Ivy (*Toxicodendron radicans*), Virginia Creeper (*Parthenocissus quinquefolia*), blackberry (*Rubus* sp.) and Fox Grape (*Vitus labrusca*) vines, which are native), to reduce their density and seeding capacity. Unlike in the previous approach, this strategy did not produce appreciable early successional habitat.

   A variety of field edge bird species and small mammals inhabited the alien thickets, so we chose not to eliminate them altogether. In this instance, instead of burning the removed shrubs, we turned them into extensive brush piles at several points at the field border, thereby providing cover and den sites for small mammals and reptiles, including Raccoons, Eastern Cottontails, Red Foxes, Opossums and Eastern Milk Snakes. Regular bird nesters in the thickets include the Blue-winged Warbler, Common Yellowthroat, Yellow Warbler, American Redstart, Indigo Bunting, Brown Thrasher, Gray Catbird, Baltimore Oriole, Orchard Oriole, Song Sparrow, Chipping Sparrow, Warbling Vireo, Yellow-throated Vireo, Rose-breasted Grosbeak, Great-crested Flycatcher, Eastern Bluebird, Pileated Woodpecker and Red-tailed Hawk, among others.

   Following reduction of the width of the field border, we initiated a program of selective removal of alien species. The first species chosen for removal were Eurasian Privet and Common Buckthorn, with elimination of all mature, seed-bearing individuals commencing in March, 2022. In 2023, we will focus on removing Multiflora Rose and Russian Olive. During removals, we also work to free from competition volunteer desirable species like Black Cherry, Nannyberry, Gray Dogwood and Siberian Crabapple.

   Initial removals did not address the presence of seedlings or the capacity of some aliens to sprout from roots. Ongoing efforts will be directed at suppressing these through cutting, string trimming and possibly through herbicide application. Moreover, we plan to continue to underplant these thickets with aggressively competitive natives, including Gray Birch (*Betula populifolia*) and Pin Cherry (*Prunus pensylvanica*). The long-term strategy is again to crowd out alien species with competitive natives, particularly fleshy fruiting species, in the hope of attracting back to this area species like the Ruffed Grouse and Northern Bobwhite—earlier successional-associated species that have all but disappeared from northeastern Connecticut.

3. As part of this second strategy, we have also established a plantation of American Chestnuts (*Castanea dentata*) directly adjacent to the field border. American Chestnut was until about 1910 one of the most ecologically and commercially important tree species in eastern North America, with a vast 200-million-acre range that extended from Maine to Alabama. It had enormous populations particularly in the

Appalachian and Allegheny Mountains, where it was estimated that as much as 30% of all standing hardwood timber was American Chestnut. It was fast-growing, fire-resistant, produced straight-trunked tall trees with high quality, rot-resistant lumber and, unlike its relatives, the oaks and beeches, it produced huge, annually consistent crops of nuts consumed by a wide variety of wildlife as well as humans.

After the introduction of chestnut blight in the late 19th century, the tree virtually disappeared as a canopy tree throughout its range, driving it into what may be termed an ecological and evolutionary bottleneck. However, it continues to sprout from roots of dead chestnuts and continues to bear seeds after about seven years of growth. Likely due to the enormous size of its original gene pool, some individual sprouts have shown traits that confer natural blight resistance. These sprouts continue to grow into the forest understory, and it is from such trees that our plantation is derived. To date, 15 of the 30 originally planted trees have survived to seedling stage, and several of these are beginning to progress to sapling stage. Because young individuals are browsed upon by deer, we protect them with plastic sleeves around the stems and an electric fence around the entire plantation. We also sprayed all seedlings with an organic, bacteria-derived toxin, Spinosad, to reduce insect damage on the developing seedlings.

In addition to plans for fall replanting of seeds in vacant sleeves, we also plan to interplant these natives with transgenic, blight-resistant trees as soon as they complete their USDA safety review. The transgenics, termed Darling 58, incorporate a single gene from wheat that provides individuals with the ability to metabolize oxalic acid—the toxic agent produced by blight. More advanced transgenic versions with superior properties are also now in development. Our concept is to allow transgenics to cross-pollinate with naturally blight-resistant individuals to produce seeds that contain a suite of disease-resistance genes. An additional approach to developing blight resistant chestnuts is also underway by the American Chestnut Society—our partner in our planting efforts. These efforts involve hybridizing American and Chinese Chestnuts (*Castanea mollissima*) and then back-crossing to American Chestnuts. Notably, much of the early work done on reviving American Chestnuts was performed at our own Connecticut Agricultural Experiment Station. Efforts directed on behalf of chestnuts continue there.

4. Still another management effort on about one acre of hayfield involves late mowing. This area is too steep for hay baling, so instead we wait until August to mow down any invading woody growth. This also ensures that any nesting birds will have had an opportunity to fledge young. As this field is adjacent to a wooded stream, it provides ideal nesting habitat for the American Woodcock, which is one of our earliest nesters. Beginning in February, the species carries out an elaborate courtship ritual in this and adjacent fields and by April it may already be sitting on eggs in either the field itself or in the adjacent woodland. Several typical grassland-nesting songbirds also have established territories in this area, including the Savannah Sparrow, Red-winged Blackbird, Bobolink and the usually midwestern-breeding Clay-colored Sparrow and Vesper Sparrow. Among these, only the Red-winged Blackbird has to date produced young. During the spring of 2022, we also had the typically southeastern-nesting, open country-associated Swallow-tailed Kite spend several weeks here. In this instance, the very vocal male appeared to find a mate in nearby Woodstock and remained there. Still other primarily midwestern-associated grassland species, the Sandhill Crane, Grasshopper Sparrow and Sedge Wren, have also found mates within the local area, so we hope to attract them onto our property as well.

**BIRD-BANDING**

In addition to our management activities, we maintain a limited bird-banding operation at the field station. Our banding work revolves around finding evidence related to two questions:

1. Do Connecticut agricultural landscapes provide a significant migratory pathway for any midwestern-nesting bird species?
2. What breeding and migratory species make use of our vegetable plots and how might their presence influence plot productivity by either suppressing pest populations or by feeding upon vegetables?

Banding activities involve not only placing a numbered metal ring on a bird's leg, but can also involve the placement of colored plastic rings. By placing plastic rings on legs in a particular sequence, individuals can be

identified in the field and tracked over time. An example of how to do this is in the *Additional Resources* #7 below. Banding also allows for computation of population size through recording recaptures or re-observations (see *Additional Resources* #8 below).

There are a number of ways to capture birds for banding. We use fine nylon nets called mist nets, but baited wire ground traps are often used for seed-eating birds. Mist nets come in different sizes and are useful for capturing birds as large as hawks. In addition, cannon nets, which use charges to propel nets over flocks of ground-inhabiting birds, may be used to capture birds such as waterfowl.

Once captured, making a series of measurements and other observations on an individual is a way to for it to be sexed, aged and to have its physiological state assessed. Such additional information as the degree of skull ossification, evidence of molt, plumage characteristics, amount of fat deposits, presence of developing eggs, presence of a brood patch or a cloacal protuberance, and presence of ectoparasites are all useful in these regards. An example of how measurements can be combined with multivariate statistics to learn about the age and sex of individuals may be found in *Additional Resources* #4 below.

**OTHER RESEARCH PROJECTS**

1. Another long-term BCR project has involved use of Distance sampling to compute the population densities of forest birds at 147 study sites in Connecticut and Rhode Island. A summary of these estimates is found under *Additional Resources* #9 below. Detailed directions and data for carrying out a Distance sampling protocol may be found in *Additional Resources* #5 and 6.
2. Census data can be combined with analysis of aerial imagery to learn about additional aspects of species and community ecology. An example that demonstrates how information on habitat use can be extracted from census data may be found in *Additional Resources* #10. An example that relates to how Distance sampling data can be combined with analysis of aerial imagery to learn about such ecological phenomena as effects of forest fragmentation may be found in Additional Resources #11.

**ADDITIONAL RESOURCES**

1. A resource that describes the history of the previous owners of the property is at https://www.blogger.com/u/1/blog/post/edit/7977687054125630 17/8292735849566208795.
2. A resource that can be used to provide background on question 5 in *Considerations* above is at https://www.birdconservationresearch.org/educators/powerpoints.php. Open *Global vs. Local Perspective on Endangerment.*
3. Bird Conservation Research, Inc. offers a number of video and PowerPoint educational resources on conservation and environmental science topics via the *Educators* tab on its web site: https://www.birdconservationresearch.org/. A number of more scholarly resources are available at https://www.birdconservationresearch.org/research_journal/scientific_papers.php.
4. Detailed directions for making morphological measurements on birds and how to employ multivariate statistics in analyzing the measurements are at https://www.birdconservationresearch.org/pdf/eskimo%20curlew%20final.pdf.
5. Detailed directions for using *Distance* sampling procedures for gathering and analyzing wildlife population surveys is at https://www.birdconservationresearch.org/pdf/labs/Variable%20circular%20plot.pdf. A sample data set that can be used in making computations are at https://www.birdconservationresearch.org/pdf/labs/Eastern%20CT%202001%20winter.txt. The data set was designed for Distance 6.0, but will work equally well in Distance 7.3—the current release.
6. An additional resource for Distance sampling that reviews how to meet the assumptions of the procedure and how to analyze results using multivariate statistics is at https://www.birdconservationresearch.org/pdf/NECT%20forest%20birds%20publisher.pdf.
7. An example of how color-banded birds can be used to map home ranges and determine aspects of social behavior is at https://www.birdconservationresearch.org/pdf/flock.PDF.
8. An example of how banding data can be used to compute population size is at https://www.birdconservationresearch.org/pdf/labs/population_estimation.pdf.
9. A compendium of Distance sampling-derived population density estimates for Connecticut and Rhode Island is at https://www.artsandacademic.net/pdf/forest%20birds%20of%20CT%20&%20RI%202.pdf.

10. An example of how census data can be combined with analysis of aerial imagery to learn about habitat use is at https://www.birdconservationresearch.org/pdf/Mariana%20Crow.pdf.
11. An example of ongoing work that combines results from Distance sampling surveys with analysis of aerial imagery to learn about community-level ecological phenomena is at https://www.birdconservationresearch.org/pdf/bcr%20newsletter%2024-4.pdf.
12. If any students wish to receive the quarterly online newsletter of Bird Conservation Research, Inc., they may do so by sending an email request to info@birdconservationresearch.org.