Shrublands

Photo by NHFG

Acres in NH: not available
Percent of NH Area: Acres
Protected: Percent
Protected:

Habitat Distribution Map

Habitat Description

Shrublands are habitats dominated by shrubs or young trees, sometimes interspersed with mature trees (see also pine barrens) or open bare or grassy areas. Typical examples in New Hampshire include regenerating timber harvests, power line rights-of-way, shrubby old fields and edges, and reverting gravel pits. From a wildlife perspective, such habitats can be subdivided into those dominated by shrubs vs. dominated by saplings (Oehler et al. 2006). The former – sometimes referred to as "scrub-shrub" – is more typical of abandoned old fields and utility rights-of-way. Such habitats can often persist for relatively long periods without the need for additional management. Saplings, on the other hand, are typical of areas subject to timber harvest, and rarely retain early successional characteristics beyond 15-20 years. These are also regularly referred to as "young forest," and are also considered under the several forest habitat profiles in the 2015 Wildlife Action Plan. Both sub-types will be referred to as "shrubland" habitat throughout this profile unless otherwise noted.

Justification (Reason for Concern in NH)

Shrubland and other woody-dominated early-successional habitats are in decline in New Hampshire and throughout the northeast region (Trani et al. 2001, Brooks 2003). As such, the wildlife species

associated with shrubland habitats are also in decline (Hunter et al. 2001, Litvaitis 2001, Dettmers 2003, Wagner et al. 2003). In New Hampshire, birds typical of early successional habitats are declining more than any other habitat group (22 of 28 species, Hunt 2009). In addition, Partners in Flight (PIF), a cooperative bird conservation organization seeking to maintain populations of North American landbirds, has identified the northeast region as being particularly important for maintaining source populations of shrubland birds and many are PIF priority species for the ecoregion that comprise New Hampshire (Dettmers 2003). Since 1960, the distribution and abundance of New England cottontail has declined substantially throughout New England (Johnston 1972, Jackson 1973, Litvaitis 1993). They have declined to such an extent that in 2006 they were designated as a "candidate" for federal listing under the Endangered Species Act. Additionally, 139 species of reptiles, amphibians, birds, and mammals either prefer (17 species) or utilize (122 species) shrub and old-field habitats (Scanlon 1992).

Protection and Regulatory Status

Shrubland habitats in general have no special regulatory status. Shrublands inhabited by state endangered or threatened species are protected under RSA 212 if habitat modification would affect the species.
Few natural resource protection programs focus on shrubland habitats.

Distribution and Research

The amount of early-successional habitat increased dramatically after European settlement. Much land was cleared for farmland in the 18th and 19th centuries (Cronon 1983, Whitney 1994). However, cleared lands were abandoned in the mid 1800s for more productive farms in the midwestern United States and the industrialized cities of the northeast. Many tracts of land that were cleared for agriculture reverted to second-growth forests and species associated with early-successional habitats abounded (Irland 1982, DeGraaf and Miller 1996, Foster et al. 2002, Litvaitis et al. 2005). Most of the abandoned farmlands matured into closed-canopy forests by 1960 and species dependent on these habitats quickly declined (Litvaitis 1993).
Today, given the lack of fires and the reduction in areas potentially impacted by beavers, coupled with the extent and effect of habitat fragmentation caused by development, especially in the southeastern part of the state, the future health of shrubland wildlife is dependent on active management to reclaim and maintain a suitable network of habitat patches on the landscape. Doing so is especially important for species like New England cottontails, which are threatened with extirpation in New Hampshire.

Relative Health of Populations

One reasonable indicator of shrubland habitat health in New Hampshire is the trend in the amount of forestland dominated by seedlings and saplings. From 1973 to 2002, the amount of area in seedling/sapling forest declined 63% from nearly 449,000 hectares to just over 167,000 hectares. Seven counties experienced a 70 – 100% decline. Grafton County experienced a 55% decline. Coos County, where much of New Hampshire's industrial forests are located, experienced only a 12% decline. More recently, increases in timber harvesting resulted in a net gain of roughly 30,000 ha of some sort of early successional habitat between 2001 and 2010 (NOAA 2014).

It is difficult to ascertain the extent of shrubland habitats in New Hampshire historically or currently. A number of mechanisms are theorized to have created and maintained shrubland habitats prior to European colonization. These include Native American use of fire and beaver activity.

Habitat Condition

A set of GIS data was used to assess ecological condition of each habitat type. Chapter 3 describes the methodology. The data used for this habitat is described below.

Biological Condition:
To be updated at a later date

Landscape Condition:
To be updated at a later date

Human Condition:
To be updated at a later date

Habitat Management Status:

Creation and management of shrublands and young forest in the Northeast have been identified as a priority by conservation partners (citations). Several large scale initiatives have been working within New Hampshire to improve the amount of this habitat available on the landscape including: The Young Forest Initiative (www.youngforest.org), The New England Cottontail Initiative (www.newenglandcottontail.org), and The Woodcock Initiative (www.timberdoodle.org). The American Woodcock and Ruffed Grouse Conservation Plans call for the creation of over 600,000 acres of early-successional habitat annually in the Northeast to restore populations of these popular game birds. There are numerous songbirds of conservation concern listed in state Wildlife Action Plans that require early-successional habitat including shrublands and Partners in Flight Plans call for the generation of millions of acres of shrubland and young forest habitats across the region to maintain or reverse declines of these species including golden-winged warblers and whip-poor-will. Similarly State and Federal agencies have been identifying and implementing management acres on lands under their control contributing to the presence of this habitat type across the landscape.

Financial & Technical Assistance Programs
There are a number of programs that provide financial and technical assistance to landowners to manage and reclaim shrubland habitats for wildlife. These include the United States Department of Agriculture's Environmental Quality Incentive Program (EQIP), as well as the United States Fish & Wildlife Service's Partners for Fish & Wildlife Program (Partners Program), and the New Hampshire Fish & Game (NHFG) Department's Small Grants Program. University of New Hampshire Cooperative Extension specialists and county-based educators in the Forestry and Wildlife Program, and NHFG Regional biologists also provide technical assistance to landowners on wildlife habitat management issues.
The Environmental Quality Incentives Program offers financial and technical help to assist agricultural producers install or implement structural and management practices on eligible agricultural land. An EQIP Technical Committee in each state sets eligible habitat improvement practices. There are nearly 70 eligible practices in New Hampshire. These include such things as nutrient management and the installation of manure storage facilities to restoration of declining habitats. Eligible EQIP practices that would benefit shrubland habitat include brush management, hedgerow planting, prescribed grazing, restoration and management of declining habitats, and tree/shrub establishment, among others. Statistics are currently unavailable to determine how many hectares have been treated with each of these practices.
Since 1990, the U.S. Fish & Wildlife Service's Partners for Fish & Wildlife Program in New Hampshire has provided technical and financial assistance to landowners, state agencies, many organizations and

individuals to restore fish and wildlife habitat such as coastal wetlands, riparian habitats, and grasslands (USFWS 2001).

Since its inception in 2001, the NHFG Small Grants Program has funded 165 acres of alder/aspen regeneration projects, and nearly 2,400 acres of old field maintenance. NHFG Regional staff provide technical assistance on the planning of these projects.

Management on State Lands

The NHFG owns in fee-simple nearly 300 hectares of fields (NHFG unpublished data). Two hundred twenty eight hectares are maintained in active agriculture (either hay or cropland). The remainder is maintained via brush hog mower with mowing occurring every 1-3 years after the bird nesting season. Field management is reviewed periodically to determine if any should be converted to shrubland habitat. Because of the great need for shrubland habitat in the southeastern part of the state, several hectares of field land on WMAs are in the process of being coverted to shrubland including nearly 15 hectares on the Lamprey River WMA in Durham, and another approximately 15 hectares on the Bellamy WMA in Dover.

The Department of Resources and Economic Development (DRED) owns in fee-simple or under conservation easement approximately 543 hectares of fields and shrubland openings (DRED unpublished data). Forty hectares are maintained in active agriculture (either hay or cropland). One hundred thirty seven hectares are maintained via mowing by State Parks or NHFG personnel. The remainder is not maintained on a regular basis. The NHFG State Lands Biologist will be working with DRED to evaluate the fields under DRED management to determine which ones would be more suited for shrubland habitat management and to develop a strategy for maintaining them.

Management on Other Lands

All other shrubland habitats occur on federal lands (e.g., White Mountain National Forest, Umbagog National Wildlife Refuge, Great Bay National Wildlife Refuge, Pondicherry National Wildlife Refuge, and others), private land, and to a much lesser extent land of private landtrusts, municipalities, and other conservation organizations/agencies. It is not known to what extent shrubland habitats are maintained on these lands.

Threats to this Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat degradation due to natural succession or lack of active management (Threat Rank: High)

Shrubland and young forest may revert to a closed canopy forest with little to no understory in the absence of disturbance reducing the available habitat for a suite of species. As more open land is converted to development there is less overall space for shrubland-dependent species to shift into when natural forest succession or lack of active management makes their current habitat patch unsuitable.

With the decline of native shrublands (e.g, pitch pine-scrub oak barrens, dune thickets) from development and degradation, human created shrublands (e.g., old fields, reverting gravel pits, rights-of-way) have increased in importance to shrubland-dependent wildlife. These human created shrublands are ephemeral and require natural or human disturbance to retain their shrubby structural characteristics (Brooks 2003).

Habitat conversion due to development and impacts from fragmentation (Threat Rank: High)

Direct loss of shrubland habitat occurs through the conversion to residential, industrial, and commercial development resulting in fragmentation of remaining habitat patches.

In eastern North America over the last 60 years, open habitats (grasslands, savanna, barrens, and shrublands) have declined by 98%, with shrubland communities comprising 24% of this decline (Tefft 2006). New Hampshire's population grew by 17.2% from 1990 to 2004--the fastest growing state in the northeast for the past four decades.

Mortality from subsidized or introduced predators (Threat Rank: Medium)

As a landscape becomes fragmented by development and agriculture, patches of suitable shrubland habitat shrink in size, while predator populations increase in number due to expanded food availability (crops, garbage, bird feed, pet food left unsecure, etc.). This makes it much more likely that predators will penetrate and prey on wildlife attempting to utilize those small shrubland patches.

Populations of generalist predators including foxes, raccoons, skunks, and crows often thrive in developed landscapes because of their ability to take advantage of resources associated with humans (Barbour and Litvaitis 1993, Oehler and Litvaitis 1996). Large populations of these predators result in predation rates that can reduce or even eliminate small populations of prey species like New England cottontails and some songbirds.

Habitat and species impacts from introduced or invasive plants (Threat Rank: Medium)

Many of the high risk invasive plants in New Hampshire are woody shrubs that thrive from disturbance. These invaders rapidly colonize sunny openings outcompeting native seedlings, in some cases forming dense monocultures. The impact of these invaders on wildlife differs greatly usually due to a change in structure or availability of food resources generated from them (berries, host specific caterpillars).

American robin experiences higher levels of predation when nesting in common buckthorn as compared to nesting in native species (Schmidt and Whelan 1999). Nutritional analysis of fruits from common native and invasive shrubs in New York showed that native shrubs have the highest fat content and energy densities (Smith et al. 2013). Monocultures of glossy buckthorn reduce diversity of woody species regeneration following canopy removal, reducing habitat quality for species such as New England cottontail which require a more varied stem structure to provide cover during winter (NHFG observation).

Habitat impacts resulting from a lack of public support for creation and maintenance of shrublands and young forest (Threat Rank: Medium)

Opposition to even age timber management ("clear cutting") has resulted in selective removal of tree species which does not result in dense shurbland and young forest.

The public support for large timber harvests (clear cuts) has generally declined in the past 50 years. A survey conducted for NHFG by Responsive Management in 2004 indicates 51% of respondents moderately or strongly oppose clearcuts <5 acres while 72% moderately or strongly oppose clearcuts >5 acres. Additionally, biologists cite lack of support by the public, landowners, and even some resource professionals to the types of management that would lead to the development or maintenance of shrublands, and a lack of funding and staff to attain habitat management goals on

public land or to provide sufficient technical and financial assistance to private landowners (Oehler
2008).

Habitat impacts from aspects of right-of-way management (Threat Rank: Medium)

Utility corridors are maintained on average 3-4 year cycle across the state by mowing all woody vegetation in the boundaries. The regeneration of the woody vegetation is beneficial to wildlife in between maintenance cycles, but may become a sink habitat resulting in losses during the year of vegetation removal.

Several species of early successional birds regularly use right-of-way, and many reach their highest densities in these habitats (Hunt 2013). Habitat along utility corridors facilitate dispersal of New England cottontail among patches (Fenderson et al. 2014).

List of Lower Ranking Threats:

Disturbance and mortality from walking and training dogs (Emphasis on off-leash

dogs) Habitat and species impacts from hiking, biking, and horse back riding

Habitat degradation and disturbance from legal and illegal OHRV activity

Habitat degradation from active sand and gravel mining and reclamation practices that make habitat unsuitable

Actions to benefit this Habitat in NH

Develop and implement a statewide invasive species management plan.

Primary Threat Addressed: Habitat and species impacts from introduced or invasive plants

Specific Threat (IUCN Threat Levels): Invasive & other problematic species, genes & diseases

**Objective
:**

**General
Strategy:**
Work with the state Invasive Species Council to develop a plan prioritizing resources for invasive species management. This is especially important when creating or maintaining shrublands and young forest habitat because it is very susceptible to invasion.

Political Location: **Watershed Location:**

Habitat Management and Restoration

Primary Threat Addressed: Habitat degradation due to natural succession or lack of active management

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:

General Strategy:
Since shrubland habitats are relatively short lived, 20 to 25 years in most cases, periodic management is needed to maintain the dense habitat structure. The frequency of vegetation management necessary to maintain shrubland conditions depends on site conditions. Relatively stable shrublands require monitoring and occasional selective cutting, mowing, or herbiciding of small trees that invade the area (e.g., every 5 years). Reclamation of old fields, pastures, or gravel pits that have succeeded to second growth forest will initially require aggressive clearing using a hydroaxe, Brontosaurus, or tree shear to remove larger unwanted trees. Once shrublands become well established they may require only periodic mowing or cutting, every 5 to 10 years or more (Tefft 2006).

Political Location: **Watershed Location:**

Work with public utility companies to develop and implement ROW management strategies that will promote shrublands

Primary Threat Addressed: Habitat impacts from aspects of right-of-way management

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:

General Strategy:
Coordinate with utility companies to develop integrated management plans that will promote shrub species and maintain cover within rights-of-way instead of clear cutting all vegetation every 3-4 years with the boundaries.

Political Location: **Watershed Location:**

Habitat Protection

Primary Threat Addressed: Habitat conversion due to development and impacts from fragmentation

Specific Threat (IUCN Threat Levels): Residential & commercial development

Objective:

General Strategy:
Permanently protecting the most important shrublands that have known populations of SGCN (e.g., New England cottontail) through fee simple acquisitions or conservation easements will ensure that these habitats are maintained in perpetuity for priority wildlife species and other plants and animals. Land conservation measures will also provide a more consistent opportunity to manage shrubland conditions that are ephemeral without human or natural disturbance.

Political Location: **Watershed Location:**
Statewide

References and Authors

2015 Authors:
Heidi Holman, NHFG, Pamela Hunt, NHA

2005 Authors:

Literature:

Barbour, M.S., and J.A. Litvaitis. 1993. Niche dimensions of New England cottontails in relation to habitat patch size. Oecologia 95:321-327.

Brooks, R.T. 2003. Abundance, distribution, trends, and ownership patterns of early-successional forests in the northeastern United States. Forest Ecology & Management 185:65-74.

Brown, A.L., and J.A. Litvaitis. 1995. Habitat features associated with predation of New England cottontails: what scale is appropriate? Canadian Journal of Zoology 73:1005-1011.

Burghardt, K. T., D. W. Tallamy, and W. G. Shriver. 2008. Impact of native plants on bird and butterfly biodiversity in suburban landscapes. Conservation Biology 23:219-224.

Chandler, R.B., D.I. King, and C.C. Chandler. 2009a. Effects of management regime on the abundance and nest survival of shrubland birds in wildlife openings in northern New England, USA. Forest Ecol. and Manage. 258: 1669-1676.

Chandler, R.B., D.I. King, and S. DeStefano. 2009b. Scrub-shrub bird habitat associations at multiple spatial scales in beaver meadows in Massachusetts. Auk 126: 186-197.

Complex Systems Research Center. 2002. Landcover Asssessment - 2001. University of New Hampshire, Durham. http://www.granit.sr.unh.edu/data/datacat/pages/nhlc01.pdf. Accessed 8 February 2002.

Costello, C.A., M. Yamasaki, P.J. Pekins, W.B. Leak, and C.D. Neefus. 2000. Songbird response to group selection harvests and clearcuts in a New Hampshire northern hardwood forest. Forest Ecol. and Manage. 127: 41-54.

Cronan, W. 1983. Changes in the land: Indians, colonists, and ecology of New England. Hill and Wang, New York, New York.

Davis, M. 2011. Do native birds care whether their berries are native or exotic? No. Bioscience 61:501-502.

Day, G. 1953. The Indian as ecological factor in the northeastern forests. Ecology 34:329-346.

DeGraaf, R.M. and R.I. Miller. 1996. The importance of disturbance and land-use history in New England: implications for forested landscapes and wildlife conservation. Pages 3-25 in R.M. DeGraaf and R.I. Miller, editors. Conservation of faunal diversity in forested landscapes. Chapman and Hall, London.

Dettmers, R. 2003. Status and conservation of shrubland birds in the northeastern US. Forest Ecology & Management 185:81-93.

Dunford, R.D. and R. B. Owen, Jr. 1973. Summer behavior of immature radio-equipped woodcock in central Maine. Journal of Wildlife Management 37: 462-469.

Fickenscher, J. L., J. A. Litvaitis, T. D. Lee, and P. C. Johnson. 2014. Insect responses to invasive shrubs: implications to managing thicket habitats in the northeastern United States. Forest Ecology and Management. 322:127-135.

Foster, D.R., G. Motzkin, D. Bernardos, and J. Cardoza. 2002. Wildlife dynamics in the changing New England landscape. Journal of Biogeography 29:1337-1358.

Howard, L. F., J. A. Litvaitis, T. D. Lee, and M. J. Ducey. 2005. Reconciling the Effects of Historic Land Use and Disturbance on Conservation of Biodiversity in Managed Forests

Hunt, P.D. 2009. The State of New Hampshire's Birds. Report to NH Fish and Game Department, Nongame and Endangered Species Program. Audubon Society of New Hampshire, Concord.

Hunt, P.D. 2013. Bird use of pine barrens and other shrubland habitats in New Hampshire: 2010-2012. Report to NH Fish and Game Department, Nongame and Endangered Species Program. New Hampshire Audubon, Concord.

Hunter, W.C., D.A. Buehler, R.A. Canterbury, J.L. Confer, and P.A. Hamel. 2001. Conservation of disturbance-dependent birds in eastern North America. Wildlife Society Bulletin 29:440-455.

Irland, L.C. 1982. Wildlands and woodlots – a story of New England's forests. University Press of New England, Hanover, New Hampshire.

Jackson, S.N. 1973. Distribution of cottontail rabbits (*Sylvilagus* spp.) in northern New England. M. S. Thesis, University of Connecticut, Storrs.

Johnston, J.E. 1972. Identification and distribution of cottontail rabbits in southern New England. M. S. Thesis, University of Connecticut, Storrs.

King, D.I., R.B. Chandler, J.M. Collins, W.R. Petersen, and T.E. Lautzenheiser. 2009a. Effects of width, edge and habitat on the abundance and nesting success of scrub-shrub birds in powerline corridors. Biol. Conserv. 142: 2672-2680.

King, D.I., R.B. Chandler, S. Schlossberg, and C.C. Chandler. 2009b. Habitat use and nest success of scrub-shrub birds in wildlife and silvicultural openings in western Massachusetts, USA. Forest Ecol. and Manage. 257: 421-426.

Litvaitis, J.A. 1993. Response of early successional vertebrates to historic changes in land use. Conservation Biology 7:866-873.

Litvaitis, J.A. 2001. Importance of early-successional habitats to mammals in eastern forests. Wildlife Society Bulletin 29:466-473.

Litvaitis, J.A., M.S. Barbour, A.L. Brown, A.I. Kovach, J.D. Oehler, B.L. Probert, D.F. Smith,

NOAA. 2014. C-CAP New England 2001-2010-Era Land Cover Change, NOAA Coastal Services Center Coastal Change Analysis Program (C-CAP).

Oehler, J.D., and J.A. Litvaitis. 1996. The role of spatial scale in understanding responses by medium-sized carnivores to forest fragmentation. Canadian Journal of Zoology 74: 2070-2079.

Oehler, J.D., D.F. Covell, S. Capel, and B. Long. 2006. Managing grasslands, shrublands, and young forest habitats for wildlife: A guide for the Northeast. Northeast Upland Habitat Technical Committee and Massachusetts Division of Fisheries and Wildlife.

Patterson, W.A. III and K.E. Sassaman. 1988. Indian fires in the prehistory of New England. Pages 107-135 in G.P. Nichols, editor. Holocene human ecology in northeastern North America. Plenum Publishing Corporation, New York, New York.

Rodewald, A. D., D. P. Shustack, and L. E. Hitchcock. 2010. Exotic shrubs as ephemeral ecological traps for nesting birds. Biological Invasions 12:33-39.

Scanlon, J.J. 1992. Managing forests to enhance wildlife diversity in Massachusetts. Northeast Wildlife Vol. 42.

Schlossberg, S., and D. I. King. 2010. Effects of invasive woody plants on avian nest site selection and nesting success in shrublands. Animal Conservation 13:286-293.

Schmidt, K. A. and C.J. Whelan. 1999. Effects of exotic *Lonicera* and *Rhamus* on songbird nest predation. Conservation Biology 13: 1502-1506.

Smith, S.B., S.A. DeSando, and T. Pagano. 2013. The Value of native and invasive fruit-bearing shrubs for migrating songbirds. Northeast Naturalist 20: 171-184.

Sundquist, D., and M. Stevens. 1999. New Hampshire's changing landscape: population growth, land conversion and resource fragmentation in the Granite State. The Society for Protection of New Hampshire Forests, Concord, New Hampshire.

Tefft, B. C. 2006. Shrublands and old fields. In A guide to managing grasslands, shrublands, and young forest habitats in the northeast. Oehler, J.D. and D.F. Covell, eds. Northeast Upland Habitat Technical Committee and Massachusetts Division of Fisheries & Wildlife.

The Nature Conservancy. 2003. Ecological land unit data layer. Conservation Science Support Program, Eastern Resource Office of The Nature Conservancy, Boston, Massachusetts.

Trani, M.K., R.T. Brooks, T.L. Schnmidt, V.A. Rudis, and C.M. Gabbard. 2001. Patterns and trends or early-successsional forests in the eastern United States. Wildlife Society Bulletin 29:413-424.

Villafuerte R., J.A. Litvaitis, and D.F. Smith. 1997. Physiological responses by lagomorphs to resource limitations imposed by habitat fragmentation: implications to condition-sensitive predation. Canadian Journal of Zoology 75:148-151.

Wagner, D.L., M.W. Nelson, and D.F. Schweitzer. 2003. Shrubland lepidoptera of southern New England and southeastern New York: ecology, conservation, and management. Forest Ecology & Management 185:95-112.

Whitney, G. 1994. From coastal wilderness to fruited plain: a history of environmental change in temperate North America from 1500 to present. Cambridge University Press, Cambridge, Massachusetts.