

# Good Forestry in the Granite State: Draft Habitat - Deer Wintering Areas

## X.X DEER WINTERING AREAS

### BACKGROUND

White-tailed deer in New Hampshire live near the northern limit of their geographic range. Because of severe winters, deer require special habitats to survive.

The winter survival of white-tailed deer is related to their ability to occupy "wintering areas" when deep snow limits food availability and deer mobility. The special habitat characteristics of deer wintering areas allow deer to maximize their daily food intake, while minimizing the amount of energy they expend to move, keep warm, and avoid predators.

Deer wintering areas (DWAs) consist of two basic habitat components:

- (1) The "core shelter area" is dense, mature softwood, which provide cover, improving the deer's ability to move in the snow.
- (2) Other habitats that provide accessible forage within or adjacent to the core area. These habitats might be hardwood stands, mixed hardwood-softwood stands, or non-forest habitats such as fields or wetlands.

The term "deer wintering area" refers to the entire area deer occupy during winter, not just the dense softwood cover – though the cover is critical and often the most difficult component to establish and maintain.

Most DWAs occur at elevations below 2,000 feet, in lowland softwood stands such as spruce-fir and northern white cedar in the north, or eastern hemlock in the south. DWAs are often associated with water courses and riparian areas, since these forest types grow there. Only about 3% of New Hampshire's land base is a deer wintering area.

Deer use of wintering areas varies within and between winters based mainly on differences in snow depth. Deer move into wintering areas when snow depth exceeds 10-12 inches and they primarily use the core shelter area when snow depth exceeds 16-20 inches. During mild winters deer may range far away from softwood shelter or they may not use a wintering area at all. Some wintering areas aren't used annually by deer, but these habitats are still critical when winter conditions are severe.

In northern New Hampshire, it isn't uncommon for some deer to travel more than 20 miles between the habitat they use in autumn and the DWA they use each year. Northern deer generally "yard" in large numbers and remain within or close to the cover provided by extensive softwood stands all winter long. In southern New Hampshire, where winter conditions are less severe, deer often make short distance movements during winter storms or periods of severe cold. They find refuge in small stands or patches of dense softwood cover near or within the habitat they use during autumn. They often don't yard in the same numbers or for the same length of time as deer in the north. As a result, DWAs in the north are often large and characterized by softwood stands exceeding 100 acres, while those in the

south are often much smaller. Softwood stands less than a few acres provide temporary cover.

## OBJECTIVE

**Manage existing deer wintering areas to provide deer with functional shelter, softwood travel lanes to access food and escape predators, and a continuous supply of accessible browse.**

## CONSIDERATIONS

- Readers are referred to the following comprehensive guides for in-depth coverage of DWA ecology and management options: Gill 1957, Boer 1978, Telfer 1978, Reay et al. 1990, Voigt et al. 1997, OMNR 2000, NBDNR 2002, Pekins and Tarr 2009, Pratte 2009. Full listings follow in additional information.
- The New Hampshire Fish and Game Department (NHF&G) provides maps of known DWAs. Because locations of wintering areas change over time, a field evaluation of the current habitat conditions is recommended before conducting any work within a known or potential DWA.
- Maintaining DWAs on working forest land requires identifying sites where core shelter and forage can develop over time. The location of core shelter areas doesn't need to be static. Timber harvesting can be used to shift the location of these stands over time, to ensure they don't become over-mature and lose their ability to provide functional shelter.
- Deer need to access adequate food throughout winter ~~in order~~ to offset their energy expenditure. This is best provided in DWAs with core shelter and forage areas highly interspersed and connected by corridors of mature softwoods. This allows deer to move between all habitats, under a variety of snow conditions.
- It isn't clear how large a softwood stand needs to be to provide functional winter cover for deer. Experience and the existing research provide some considerations:
  - As you move from southern New Hampshire north, deer likely require larger core shelter areas due to the inherent differences in winter severity.
  - Wherever snow depth regularly exceeds 16-20 inches, individual core shelter areas should probably exceed twenty five acres.
  - In the south, pockets of softwoods as small as 1 acre may provide functional cover, especially when crown closure in these stands approaches 100% *percent*
  - Small acreage softwood stands may effectively provide cover from cold temperatures or improve their access to forage. These stands may be ineffective in protecting deer from predators if they aren't large enough to enable deer to establish complex trail networks throughout the wintering area.
- Hemlock and northern white cedar provide the best winter cover for deer due to their superior ability to intercept snow. Spruce and balsam fir are important cover, but require denser stands to intercept the same amount of snow. Pines must grow in stands with considerably more than 70% *percent* crown closure to reduce snow depth.
- Hardwoods provide little to no cover for deer during winter. Hardwood stands on south- to west-facing slopes are important. During the day, deer often bed in these stands to be warmed by the sun's heat. Sun and wind often exposes fallen acorns and

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beechnuts which are among the highest quality winter foods.

- After deer learn the location of their wintering area from their mother they generally return to it for life and are very reluctant to abandon it for a new one. Focus on enhancing or expanding existing DWAs before attempting to create a new ones.
- The aggregation of small DWAs on multiple ownerships provides a significant portion of the winter range of deer in New Hampshire.
- All forms of softwood silviculture can be compatible with DWA management, as long mature softwood stands previously managed for cover are harvested only when regenerating stands have grown and are able to immediately supplant the cover being removed.
- Maintaining stands within the DWA for a balanced age-class distribution provides habitat for a diversity of wildlife, reduces the susceptibility of softwood stands to common insect pests (e.g., spruce budworm), and allows for a continued yield of forest products.
- Landowners for which DWA management is a priority may have to reduce or delay timber harvests on a portion of their land, ~~in order~~ to develop the softwood age-classes or to establish harvest rotations required to create and maintain functional core shelter areas. Such accommodations may increase the administrative costs of harvesting and require landowners to defer income.
- Because of deer browsing, regenerating many hardwood trees and some softwoods (e.g., hemlock, cedar) can be difficult in stands located in and adjacent to DWAs. Options for reducing this impact include (1) focused hunting, (2) locating openings away from wintering areas, and (3) providing a number of browsing opportunities for deer each time you cut trees. Make a number of openings, rather than a single opening, so browsing isn't concentrated within a single area.
- The potential negative impacts of providing deer with supplemental food during winter outweigh the potential benefits.
  - Supplemental food concentrates deer in unnaturally high densities leading to significant over-browsing of natural foods around feeding sites. Even where supplemental food is provided, deer rely on natural browse for the majority of their daily food intake. Over-browsing may reduce the overall ability of the wintering area to meet the needs of deer.
  - Supplemental feeding cause deer to alter their annual migration patterns. They concentrate their activity near residential areas and away from historic wintering areas that provide cover.
  - Supplemental feeding sites may increase the risk of deer contracting and spreading serious diseases such as chronic wasting disease and bovine tuberculosis.

## RECOMMENDED PRACTICES

### General recommendations for managing DWAs

- Contact NHF&G to find out whether known DWAs occur on your land and for assistance planning timber harvests in known or potential DWAs.
- Develop and maintain a balanced distribution of timber age-classes across the DWA to maintain a constant supply of core shelter.

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- Maintain "functional" core shelter on at least 50% of the DWA at all times. Functional shelter is provided by softwood stands that are at least 35 feet tall, with softwood crown closure between 65 to 70% percent
- Throughout the remainder of the DWA, maintain forage areas that provide a steady, abundant source of accessible browse by clearcutting 1 to 5 acre openings using a 40-year rotation and 10-year cutting cycle. Locate browse cuts within 100 feet of core shelter areas.
- Throughout the DWA, maintain strips of closed-canopy softwoods as travel corridors that connect core shelter areas with forage areas. Integrate these strips with riparian management zones. Strips should be at least 100 to 300 feet wide and managed with uneven-aged silviculture to maintain softwood crown closure greater than 75% percent
- Winter is generally the best season to harvest timber from DWAs since deer forage on fallen tree tops and tree lichens, and skid trails improve deer mobility. Summer logging is preferred when soil scarification is required to regenerate desired softwood species such as hemlock, spruce, and fir.
- Protect advanced softwood regeneration. Layout skid trails and incorporate harvesting technologies and techniques that have a lower impact to advanced regeneration.
- During winter, avoid or limit disturbance to deer within the DWA by routing all truck roads around, rather than through, core shelter areas.

### Forest-Type Specifics

- In spruce-fir stands, uneven-aged management using group selection is the preferred method for managing DWAs and is especially important in softwood stands smaller than 100 acres. Make group openings between 20 to 40 feet in diameter. Rotation ages targets are 70 years for fir to 100 years for spruce.
- Suitable options for even-aged systems in spruce-fir stands depends upon advanced regeneration. If advanced regeneration is present, conduct an overstory removal. If regeneration is absent, use a two-cut shelterwood system or strip clearcutting to stimulate seedling growth.
- Favor spruce over fir because spruce is longer lived, is generally more root firm, and is less susceptible to common insect pests.
- Favor hemlock when possible since it provides the best cover of all the softwood species. Management of eastern hemlock stands may be difficult. Seek professional advice. Refer to Tubbs (1978) and Reay (1985) for details on hemlock silviculture.
- Release advanced hemlock regeneration and establish browse by removing competing hardwoods around the core cover area.
- If DWA management is a priority, manage hemlock core shelter areas with at least a 150 year rotation. Hemlock is very long-lived and large, older hemlock found growing in many DWAs tend to have poor timber quality.
- If advanced hemlock regeneration is present, conduct a single removal of the overstory trees in areas scheduled for regeneration. If there is inadequate regeneration, a two or three stage harvest is recommended.
- If harvesting in the summer, scarify the soil and remove advanced hardwood regeneration.
- In DWAs less than 10 acres, retain most or all of the hemlock to ensure the long-term production and maintenance of functional deer shelter.
- Northern white cedar can be extremely hard to regenerate because it grows slowly and

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is also a highly preferred browse species. If a cedar DWA is encountered, contact NHF&G for details on management options.

## CROSS REFERENCE

Wetlands x.x, Riparian Areas 2.1; Overstory Inclusions 3.1; Permanent Openings 3.2; Regeneration: The Right Tree on the Right Site 5.1; Forest Structure 5.2; Managing for High Quality Trees 5.3; Clearcutting 5.5.

## ADDITIONAL INFORMATION

Boer, A. H. 1978. Management of deer wintering areas in New Brunswick. Wildlife Society Bulletin 6: 200-205.

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New Hampshire Fish and Game Department. 2001. More harm than good: Here's why the New Hampshire Fish and Game Department urges you to not feed the deer..

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OMNR. 2000. Significant wildlife habitat technical guide. Ontario Ministry of Natural Resources, Queens Printer for Ontario, Toronto, Canada. 139 pp.

Pekins, P. J., and M. D. Tarr. 2009. A Critical analysis of the winter ecology of white-tailed deer and management of spruce-fir deer wintering areas with reference to northern Maine. Cooperative Forestry Research Unit, Research Report RR-08-02. Orono, Maine. 154 pp.

Pratte, J. J. 2009. Guidelines for managing deer wintering areas in northern, western and eastern Maine – Draft. Maine Department of Inland Fisheries and Wildlife. Augusta, ME.

Reay, R.S, D.W. Blodgett, B.S. Burns, S.J. Weber, and T. Frey. 1990. Management Guide for Deer-Wintering Areas in Vermont. Vermont Department of Forests, Parks & Recreation and Department of Fish & Wildlife. 35pp.

Telfer, E.S. 1978. "Silviculture in Eastern Deer Yards." Forest Chronicles 54: 203-208.

Voigt, D. R., J. D. Broadfoot, and J. A. Baker. 1997. Forest management guidelines for the provision of white-tailed deer habitat, Version 1.0. Ontario Ministry of Natural Resources, Queen's Printer for Ontario, Toronto, Canada. 33 pp.

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# Good Forestry in the Granite State: Draft Habitat - Woodland Raptors

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## **x.x WOODLAND RAPTOR NEST SITES**

### **BACKGROUND**

**Suitable nest sites for woodland-nesting raptors are limited. These birds can be sensitive to human disturbance and habitat changes in the vicinity of nests. Continued existence of these birds depends on an adequate supply of potential nest trees.**

Accipiters (sharp-shinned and Cooper's hawks, and northern goshawk) build large stick nests on large branch fans of white pines next to the tree bole, and in "basket" forks of mature hardwoods at different canopy heights. They often reuse the same nest in successive years, or build a new nest in another nearby tree. Goshawks build nests in the base of the canopy often in areas with prior goshawk nesting. Sharp-shinned and Cooper's hawks tend to build their nests higher in the canopy. Sharp-shinned hawks tend to nest in younger, dense forest stands; Cooper's hawks nest in more open forests. Goshawks nest in more mature forests in or near large white pines.

Buteos such as red-tailed, red-shouldered, and broad-winged hawks build large stick nests in "basket" forks of mature hardwoods and on large branch fans of white pines that are often near the edges of open, non-forest areas such as upland openings, marshes, beaver ponds and old woods roads. Red-shouldered hawks nest in mature woodlands near water or wetlands.

Ospreys nest on dead or dead-topped trees, most often in white pines but occasionally in other tall softwoods. Osprey nests are often near large lakes, wetlands or stream riparian zones, but may occasionally be in upland settings some distance from open water.

Bald eagles usually nest within 1/2 mile of water along shorelines of large lakes and estuaries in large white pines or hardwoods. Both osprey and bald eagle nests are typically used for years or even decades, with pairs adding additional nesting material each year.

Cavity nesting owls (barred, long-eared, saw-whet, and screech) use a range of sizes of cavity trees in forested and riparian areas. Great horned owls commonly occupy large stick nests built by red-tailed hawks, crows, ravens, herons, and squirrels. Barred and long-eared owls may also use stick nests.

Excessive human activity near raptor nests in the early weeks of the breeding season may cause a pair to abandon the site; or if later in the nesting cycle, may cause an incubating or brooding female to flush from the nest, leaving eggs or nestlings vulnerable to fatal chilling or consumption by a predator.

### **OBJECTIVE**

**Manage for suitable nest trees and potential replacement nest trees for woodland-nesting raptors and avoid disturbance of nesting pairs during the breeding season.**

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## CONSIDERATIONS

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- NO Osprey
- Cooper's hawk, northern goshawk and red-shouldered hawks are species of conservation concern in the NH Wildlife Action Plan.
  - The number of nesting pairs of ospreys state-wide has steadily increased to 68 in 2008 from the early 1980s when 10 to 20 pairs nested in Coos County near the Androscoggin River. Though ospreys were removed from the state-threatened list in 2008, they remain a NH species of conservation concern.
  - The number bald eagle nesting pairs have steadily increased to 15 in 2008 since bald eagles resumed nesting in New Hampshire in 1988. Bald eagles were removed from the federally threatened list in 2007 and remain on the state-threatened list and a species of conservation concern.
  - No regional surveys assess the status of owls.
  - Identifying woodland raptor nests can be difficult without the birds' presence and activity. Active nests can be difficult to determine outside of the nesting season (March to July). Multiple raptor nests indicate areas where past raptor nesting has occurred. Active nest trees are often discovered during harvesting.
  - Because of their poor form (from a timber value perspective), potential raptor nest trees may be removed during timber stand improvement.
  - While northern goshawks will aggressively defend their nest sites, some raptor species such as red-tailed and broad-winged hawks can be more tolerant of nest disturbances than other species.
  - Nesting raptors may tolerate vehicular traffic on regularly used roads. However, all-terrain vehicle (ATV) traffic on otherwise unused roads and trails can be a disturbance factor.
  - Great horned owls prey on both adult and nestling hawks and can discourage some hawk nesting attempts in landscapes with a significant open, non-forest component.

## RECOMMENDED PRACTICE

- Look for stick nests in sawtimber-size white pine and hardwoods along woods roads and trails, near water and forest openings.
- Avoid recreational use of logging roads adjacent to active nests during the raptor nesting season (mid February-July). Trails may be temporarily re-routed around nesting areas.
- Retain trees containing large stick nests and some potential nest trees especially those hardwoods with multi-pronged 'basket' forks, and large cavity trees (see Cavity Trees, Dens and Snags 3.7).
- In clearcuts, leave a group of several large trees for each 5 to 10 acres to ensure future availability of mature trees for nest sites. These clumps also can serve cavity needs.
- Where raptor nests are found, leave a partially closed canopy using either single-tree management or a small uncut buffer of at least a chain around the nest trees leaving more than just the nest tree(s).
- Minimize nesting season disturbances around active nests.
  - Temporarily limit forest management activities (tree cutting, road construction, etc.) within 10 chains (660 feet) of active raptor nests during mid-February to July; with the understanding that tolerance levels are highly variable among

raptor species and individuals of a given species and that each situation can be different.

- If nests are discovered during harvesting, if possible, continue working in another area while the birds are nesting until the young raptors have fledged.
- For bald eagles, avoid human activity within 5 chains (330 feet) of active nests from February 10 August 31. Contact the Nongame and Endangered Species Program at the NH Fish & Game for assistance when planning a harvest within 1/4 mile of a nest. Refer to timber operations and forestry practices guidelines in National Bald Eagle Management Guidelines.
- Though peregrine falcons aren't tree-nesters, minimize potential recreational and rock-climbing disturbance around cliff-nesting sites during the breeding season.

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### CROSS REFERENCE

Cavity Trees, Dens and Snags 3.7; Forest Structure 5.2.

### ADDITIONAL INFORMATION

Elliott, C.A. 1988. A Forester's Guide to Managing Wildlife Habitats in Maine. University of Maine Cooperative Extension, Orono, ME.

U.S. Fish and Wildlife Service. 2007. National bald eagle management guidelines. <http://www.fws.gov/pacific/eagle/NationalBaldEagleManagementGuidelines.pdf> Accessed February 23, 2010.

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# Good Forestry in the Granite State: Draft Habitat - Bald Eagle Winter Roosts

## X.X BALD EAGLE WINTER ROOSTS

### BACKGROUND

Wintering eagles need secure hunting perches, predictable food sources, and sheltered roosting areas.

Eagles stand more than 3 feet tall and have a 6 to 7 1/2-foot wing span requiring large trees for suitable perches. Trees with large, widely spaced branches provide the structure these large raptors can use. Large shoreline trees adjacent to open water provide perch sites from which eagles can scan the water for food, and to which they return with prey to eat. Stands of mature conifers, particularly white pine, sometimes mixed with large hardwoods, provide sheltered roosting areas where eagles spend the night and periods of inclement weather. These roosts are characterized by large-diameter white pines spaced far apart to allow easy access into the roost yet provide sufficient overhead cover. Roost trees are often found on easterly facing steeper slopes so the birds can roost out of the prevailing winds.

Winter roost sites are typically located near foraging areas (i.e., ducks, geese, fish, and roadkill), though they may be some distance from the shore. Roosts must provide protection from the wind and from excessively cold temperatures, as well as open access to perch sites. Winter is stressful because cold temperatures increase energy demands and food can be difficult to obtain. Eagles spend many winter hours perching quietly in protected locations.

Eagles vary in their tolerance of human activity, depending on the individual eagle, the particular roost or perch, and even the individual human involved. Human activity near roosts and perches can interfere with foraging and disturb eagles from protected perches, increasing energy demands and sometimes forcing eagles to perch in exposed locations.

Winter bald eagle counts in New Hampshire have increased since 1982 from two to a record 67 in 2008. Wintering bald eagles occur in limited areas usually near open water in the Lakes Region, the Great Bay area, and along open stretches of the Androscoggin, Merrimack, and Connecticut rivers.

### OBJECTIVE

Manage for structural habitat features (i.e., tree branching patterns and stand densities) of shoreline perch trees and night roost areas. Avoid human disturbance of these sites from December-March.

### CONSIDERATIONS

- Consistently used roost and perch sites are limited in number and extent and are documented from annual monitoring.
- Winter eagle roosts are difficult to recognize when the eagles aren't present.

## RECOMMENDED PRACTICES

- Maintain large trees, particularly large white pines, along shorelines of large rivers, lakes and estuaries, for perching, nesting and roosting.
- When considering a white pine harvest within 1/2 mile of the shore in an identified wintering area, or when planning a harvest in the vicinity of a known roost, consult the Nongame and Endangered Species Program at the **NH** Fish & Game Department for assistance in planning harvest activities. *N.H.*
- Avoid harvesting in stands where eagles are known to roost.
- Avoid routing recreational or logging trails in the immediate vicinity of known and potential night roosts and day perches.
- Permanently protect remaining undeveloped shorelines on major water bodies.

## CROSS REFERENCE

Bald Eagle and Osprey Nests 4.6.

## ADDITIONAL INFORMATION

NH Fish and Game. Bald Eagle Profiles. [http://www.wildlife.state.nh.us/Wildlife/Wildlife\\_profiles/profile\\_bald\\_eagle.htm](http://www.wildlife.state.nh.us/Wildlife/Wildlife_profiles/profile_bald_eagle.htm) Accessed February 23, 2010.

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
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# Good Forestry in the Granite State: Draft Habitat - Heron Colonies

## 4.5 HERON COLONIES

### BACKGROUND

Hérons nest in colonies (colonial nesters) in mature trees in or near wetlands. Nesting birds tend to be very sensitive to human disturbance.

Great blue herons are large wading birds that nest in colonies of several to many pairs. Nesting colonies usually are found near wetland and shoreline feeding areas, though they occasionally will nest at some distance from wetland feeding areas. Most southern New Hampshire nests occur in dead trees in beaver ponds. North Country nests are usually in live white pines that tower above the surrounding tree tops. Heron colonies also may occur in mature live hardwoods on upland sites. Heron colonies come and go over time; often as nesting snags fall and trees lose their branches or as a nearby food source changes.

Human activity in the vicinity of a nesting colony during the breeding season may lead to low productivity or abandonment, and distance from human settlements appears to be a significant factor in colony site selection. Great blue herons will flush from nests in response to intrusions at distances of roughly 400-600 feet early in the breeding season (April-May) before incubation has begun, and at distances of roughly 100-300 feet during incubation and nestling periods.

### OBJECTIVE

Prevent disturbance or loss of heron nesting colonies.

### CONSIDERATIONS

- Information on location and numbers of great blue heron colonies across the state is lacking. Most of the known colonies are located south of the White Mountains.
- Great blue herons are protected as are all migratory birds under the federal Migratory Bird Act of 1918.
- Given the short sight distances of the birds and the dynamic nature of nesting colonies in the northeast, past recommended buffers appear to be larger and more restrictive than needed to protect heron colonies.
- New road construction in the vicinity of a nesting colony may result in nest abandonment. Nesting herons may tolerate vehicle traffic on existing roads, but pedestrians visible from nests are often more of a problem than traffic.

### RECOMMENDED PRACTICES

- Within roughly 330 feet (5 chains) of an active, occupied heron colony:
  - Refrain from cutting live or dead nest trees.
  - Locate roads and trails outside the buffer. If not possible, avoid road construction, harvesting, and recreational activity during the breeding and nesting

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season (April-August).

- Limit harvest activity to single-tree or small group selection harvests outside of the breeding and nesting season.
- Increase the buffer distance if conditions make it likely that nesting birds might be disturbed beyond the 330 foot buffer
- Report heron colony locations to NH Fish and Game Department Nongame and Endangered Wildlife program or NH Bird Records.

N.H.

### CROSS REFERENCE

Wetlands and Riparian Areas 2.1; beaver created openings 3.X.

### ADDITIONAL INFORMATION

Elliott, C.A. 1988. A Forester's Guide to Managing Wildlife Habitats in Maine. University of Maine Cooperative Extension, Orono, ME.

Migratory Bird Act of 1918 <http://www.fws.gov/laws/lawsdigest/migtrea.html> Accessed on February 23, 2010.

NH Bird Records <http://www.nhbirdrecords.org> Accessed on February 23, 2010.

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# Good Forestry in the Granite State: Draft Habitat - Wildlife Species of Greatest Conservation Need

## X.X WILDLIFE SPECIES OF GREATEST CONSERVATION NEED

### BACKGROUND

Species of greatest conservation need (SGCN) are those wildlife species whose populations are declining, or are naturally rare and some action is needed to ensure their continued existence.

For many species, the reduced availability of habitat is a factor in their decline. Especially sensitive to habitat change are those with needs that are only met by specific habitat characteristics, such as a particular plant community, a particular hydrologic or temperature regime, or a particular size of habitat patch. Forest management activities can enhance, be neutral or degrade the habitat of certain species.

Some of the SGCN are listed as threatened or endangered under the NH Endangered Species Conservation Act (RSA:212-A:4) and have some regulatory protection. Others are listed in the NH Wildlife Action Plan with conservation actions that can help prevent them from declining and needing to be listed under the Act. Modification in routine silvicultural operations may benefit these species. These decisions are best made on a site-specific basis.

### OBJECTIVE

To sustain wildlife species of greatest conservation need in habitats where they occur, and to restore habitats to recover their populations.

### CONSIDERATIONS

- <sup>N.H.</sup> (NH) Fish and Game (NHF&G) has legal authority regarding all wildlife- game, nongame and endangered or threatened species. NHF&G maintains the list of New Hampshire's endangered and threatened wildlife. The list identifies the most imperiled wildlife in the state. NHF&G uses it to determine protection and management actions necessary to ensure the survival of the state's endangered and threatened wildlife. The list is available through the NHF&G and is included in the appendix which also shows what other chapters in this manual address the needs of these species.
  - Endangered wildlife are those native species that are in danger of becoming extinct in New Hampshire because of loss or change in habitat, over-exploitation, predation, competition, disease, disturbance, or contamination.
  - Threatened wildlife are those native species that are likely to become endangered in the near future, if conditions surrounding them begin, or continue, to decline.
- If there are documented state threatened or endangered species (listed in RSA 212-A:4 and FIS 1000), actions that result in a "take" of that species are prohibited. It is important to understand the needs of those species and incorporate them into plans and activities.
- The specialized habitat needs of rare wildlife make it difficult to identify general

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guidelines and recommended practices. Guidelines need to be species-specific and applied where the species is known or likely to occur. Specific habitat management techniques for some species can be found in DeGraaf *et al* (2007), other chapters in this manual, and the Habitat Stewardship Series by UNH Cooperative Extension.

- Some modification of forestry practices may be necessary to conserve, protect, or enhance the habitat for rare species. In many cases, simple modifications of routine forestry operations will satisfy species needs. These modifications may involve changing the timing (after nesting) or season (frozen ground) of the operation. They may include selecting a different silvicultural technique or changing the individual trees that are cut. In some situations, leaving the area uncut may be the best option.
- Targeting management for one particular species may not meet the needs of other desired species.

## RECOMMENDED PRACTICES

- To find what SGCN species could be on your property, based on habitat and geographic location, check the NH Wildlife Action Plan and documents by NHF&G, UNH Cooperative Extension and others. DeGraaf and Yamasaki (2001) is a resource for natural history information. *N. H.*
- Survey your property for species and habitats. Check with the NH Natural Heritage Bureau (NHNHB) for any documented threatened or endangered wildlife species. Ask NHF&G biologists for advice, especially if planning a harvest. Incorporate habitat management for SGCN species into your management plan and management activities. *N. H.*
- When possible, look beyond property boundaries to consider landscape-scale opportunities, including working with neighbors to conserve SGCN species.
- Each wildlife species has specific habitat requirements, making general recommended practices difficult to identify. A few selected species of forested habitats are discussed in other chapters. See appendix, *Species of Greatest Conservation Need*, for those species and where to find that information. Check the species profiles in the NH Wildlife Action Plan (WAP Appendix A) for basic habitat needs. Seek other resources on habitat needs from NHF&G, the U.S. Fish and Wildlife Service or UNH Cooperative Extension. *N. H.*

## CROSS REFERENCE

Vernal Pools, Old Growth Forests, High Elevation Forests, Pine Barrens, Cavity Trees, Dens, and Snags, Wetlands, Riparian Areas

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# Good Forestry in the Granite State: Draft Sensitive Areas - Additional Reading

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Natural Community Systems of New Hampshire

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## Topics in this Section

Natural Communities and Protected Plants

Seeps

Vernal Pools

Pine Barrens

Old Growth Forests

High Elevation Forests

Steep Slopes

Cultural Resources

# Good Forestry in the Granite State: Draft Sensitive Areas - Natural Communities and Protected Plants

## 4.1 NATURAL COMMUNITIES AND PROTECTED PLANTS

### BACKGROUND

Protecting and conserving natural communities and threatened and endangered plants is essential to maintain native biodiversity.

Natural communities are recurring assemblages (groups) of species found in particular physical environments. Familiar examples include *hemlock - beech - oak - pine forest*, and sugar maple dominated *rich mesic forest*. The N.H. Natural Heritage Bureau (NHNHB or Natural Heritage) recognizes 192 natural communities, of which 42 are wooded uplands and 38 are wooded wetlands or floodplain forests.

Natural Heritage evaluates the ecological significance of natural communities and assigns a quality rank. Quality ranks are a measure of the ecological integrity of a community relative to other examples and are based on community size, ecological condition, and landscape context. Exemplary communities include all viable occurrences of rare natural community types, and higher quality examples of more common communities. Exemplary natural communities occupy only a small part of the landscape.

#### Rich Woods

Rich woods are a special subset of hardwood forest communities. These communities share a diverse assemblage of plants restricted to nutrient-rich conditions. Many rare plants occur in rich woods. Sugar maple, white ash, and a species-rich herbaceous layer are hallmarks of rich woods. Ferns, perennial forbs, and sedges are abundant, including many species that flower in early spring. Shrubs are sparse. Rich woods typically occur on south facing positions associated with bedrock types that weather to form enriched soil conditions, an infrequent combination of conditions in the state.

New Hampshire has about 1,500 species of native vascular plants, about 25 percent of which are protected by the New Hampshire Native Plant Protection Act (RSA 217-A). Another three plants are protected by the federal Endangered Species Act, only one of which, small whorled pogonia, occurs in forests.

Many threatened and endangered plants occur in non-forested habitats such as marshes, riverbanks and alpine areas. Threatened and endangered plants of forests are largely restricted to uncommon habitat types occupying a small portion of the landscape. Black maple, river birch, hackberry, and jack pine are four threatened and endangered tree species that may reach harvestable size. Black maple typically occurs with sugar maple on moist, rich soils of river bottoms in mixed hardwood forests in southern New Hampshire. River birch is restricted to stream banks and other moist places, and hackberry usually occurs on rich, moist sites along stream banks or on floodplains. Jack pine occurs on only a few acidic rocky summits at moderately high elevations in the White Mountains, and lakeshore settings

*is N.H. the northern range for this tree?*

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north of the mountains.

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### Small Whorled Pogonia

*Format?* Small whorled pogonia is a federally threatened orchid. It grows in hemlock-beech-oak- white pine forests along with Indian cucumber-root, New York fern, partridgeberry, rattlesnake plantain, and witch hazel. As of 2008, Natural Heritage identified 49 populations, although only six have good or excellent viability. It tolerates some disturbance, and persists in stands managed for timber. Habitat management experiments (e.g., canopy thinning) may maintain population viability, but the long-term beneficial effects have not been confirmed.

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The New Hampshire Native Plant Protection Act, RSA 217-A, protects and conserves plants for human needs and enjoyment, the interests of science, and the economy of the state. The NHNHB administers the Act, including collecting and analyzing data on the status, location, and distribution of rare or declining native plants and exemplary natural communities, and developing and implementing measures for their protection, conservation, enhancement, and management.

The NHNHB is not a regulatory agency, and its statute specifically gives private property owners the right to take protected plant species on their own lands. The statute directs state agencies to avoid jeopardizing the continued existence of any protected plant species. Prohibited acts include exporting or importing protected species into or out of New Hampshire, transporting protected species within the state, and taking, possessing, and selling any protected species from public property or property of another.

The Endangered Species Act applies to federally listed threatened and endangered species, three of which occur in New Hampshire as of 2009. Rights and prohibitions resemble the New Hampshire Native Plant Protection Act, though the right to take protected species on one's own property is less explicit.

## OBJECTIVE

**Maintain natural communities and threatened and endangered plants.**

## CONSIDERATIONS

- Most exemplary natural communities and threatened and endangered plants occur in distinct, small patches in the forest and conflicts with forestry operations are rare. Adoption of appropriate silvicultural and timber harvesting techniques can avoid or minimize impacts. Knowledge of the effect of various forestry practices is limited, but expanding.
- Protecting natural communities and plants may reduce harvest volume and increase planning costs, resulting in a reduced income.
- Some natural communities and plants depend on disturbance (e.g., fire or timber harvest) for their maintenance. Disturbance suppression, combined with natural succession, may alter or eliminate species or communities.
- Threatened and endangered and other uncommon plants may grow in non-exemplary communities.

- The NH Department of Environmental Services wetland permit applications require determining if the NHNHB has identified threatened and endangered plants or an exemplary natural community in the wetland. Applicants can use the DataCheck Tool to determine if a plant or community is potentially impacted, or contact the NHNHB.
- Identifying certain threatened and endangered species and natural communities requires specialized training. The Natural Heritage Bureau website includes a list of threatened and endangered plants by habitat type and a photo index of natural communities. Fact sheets, including identification aids, are available for many rare species from the Maine Natural Areas Program.
- Working with Natural Heritage helps avoid or minimize impacts and eliminates or reduces permit effort, cost, and restrictions.

## RECOMMENDED PRACTICES

- Look for threatened and endangered plants and exemplary natural communities during field visits or forest inventories and include findings and recommendations for their protection and conservation in your management plan.
- Look for areas with distinct vegetation or extreme site conditions (e.g., very dry, wet, or nutrient rich) when surveying or working in a harvest area. Contact Natural Heritage early in your planning to determine the presence or absence of protected species and communities in a harvest area.
- Avoid excessive changes in stand composition and structure, crown closure, forest floor characteristics, and other stand conditions if harvesting in areas with threatened and endangered species and exemplary natural communities. When possible, harvest during the non-growing season. In general, management should focus on communities rather than individual species.

## CROSS REFERENCE

Wetlands and Riparian Areas xx; Old-Growth Forests xx.

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# Good Forestry in the Granite State: Draft Sensitive Areas - Seeps

## X.X SEEPS

### BACKGROUND

**Seeps are small, local critical habitats only detected through site visits.**

Seeps or seepage wetlands are springs, pools, or other wet places where groundwater naturally comes to the surface. Soils remain saturated for all or part of the growing season, and often stay wet throughout the winter. Surface waters often percolate back into the ground through porous layers of sand or gravel, but on hillsides, seeps may be headwaters for small streams

There are five broad categories of seep communities: (1) seepage marsh, (2) riverside seep, (3) seepage swamp, (4) seepage forest, and (5) forest seeps.

(1) Seepage marshes occur in association with wetland borders, in headwaters, and along stream drainages.

(2) Riverside seeps occur along larger rivers with outcrops, open bedrock, cobble, sand, or silt substrates.

(3) Circumneutral (i.e. having water around neutral pH) seepage swamps are rare features of coastal lowlands characterized by red maple, black ash, and swamp saxifrage.

(4) Northern white cedar and northern hardwood seepage forests (characteristic trees include sugar maple, yellow birch, and balsam fir) occur in northern New Hampshire.

(5) Forest seeps occur throughout the state in stream headwaters, on hillside slopes, along swamp margins, and on steep faces of river terraces. Trees are similar to the surrounding forest, and herbaceous vegetation is abundant, diverse and variable.

Acidic sphagnum forest seeps are a notable type, most frequent in red spruce, black spruce and balsam fir forests at higher elevations in the White Mountains and farther north.

Trees aren't a significant part of seepage marshes and riverside seeps. Seepage swamps, seepage forests, and forest seeps are typically small (less than or equal to 1/10 acre) inclusions within upland forests isolated from larger wetlands. Seepage swamps and forests occur over bedrock or till, on seasonally saturated sloping transitions between uplands and flat swamps, and on lower mountain slopes.

Seep waters may remain underground for many years, producing clean waters and warmer temperatures than typical surface waters in winter and cooler than typical surface waters in summer. Seep habitats are important for animals and plants because flow may keep the waters from freezing and they are the first to green-up in the spring. Black bear prefer seeps as important food sources in the spring and summer. Deer and moose seek seeps for food, water, and occasionally elements like calcium or sodium that may be present in the groundwater.

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Northern dusky and two-lined salamanders prefer seep habitats and they in turn attract predators such as skunk, raccoon, and river otter. Woodcock and robins depend on seeps for water and food (e.g., earthworms, insect larvae, etc.) after migrating and as a refuge after early spring snowstorms. Ruffed and spruce grouse are attracted to seeps for water during winters and fresh plant food in the spring. Wild turkeys favor seeps in winter.

Seeps located adjacent to streams or rivers maintain coldwater habitats for trout and salmon during summer months when warmer water can result in fish mortality. These same sites also foster fish survival in the winter by creating a warmer environment than would normally occur. Trout and salmon abundance is related to seeps and groundwater upwelling in streams and rivers.

Several rare plants are associated with seeps. For example, calcareous riverside seeps are habitat for six rare plants including the endangered Garber's sedge, hair-like beakrush, and muskflower. Acidic sphagnum forest and circumneutral hardwood forest seeps are particularly rich in rare plants.

## OBJECTIVE

**Avoid direct impacts to seeps and minimize disturbance to the adjacent forest during timber harvesting.**

## CONSIDERATIONS

- Some seeps meet the statutory definition of wetland and are subject to state wetlands regulations.
- The NH Natural Heritage Bureau can help when planning forestry activities near seeps to avoid or minimize impacts to rare plants and exemplary natural communities.
- Removing surface soils by road construction or other activities may inadvertently create seeps subject to regulation by the N.H. Department of Environmental Services.
- Harvesting near seeps may alter the natural community.

## RECOMMENDED PRACTICES

- Delineate seeps prior to harvesting.
- Maintain a vegetated buffer around seeps to prevent sedimentation, increased water temperature and increased drying from reduced shading.
- Locate roads and skid trails in the spring or summer when seeps are most visible.
- Conduct selection harvesting or uneven-aged management near seeps when the ground is frozen.
- Keep tree tops and slash out of seeps and wildlife trails that access seeps.
- Minimize the interruption of groundwater flow by adherence to best management practices (BMPs).

## CROSS REFERENCE

Wetlands and Riparian Areas x.x; High Elevation Forests x.x.

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# Good Forestry in the Granite State: Draft Sensitive Areas - Vernal Pools

## X.X VERNAL POOLS AND THE SURROUNDING FOREST

### BACKGROUND

Vernal pools and the adjacent forest provide critical habitat for numerous wildlife species, but vernal pools are easily overlooked because they are small and dry seasonally.

Vernal pools form in shallow depressions or basins, and may appear as simple pools of water, with little or no vegetation growing in them. To be considered a vernal pool, the pool can't have a permanently flowing outlet and it must hold water for at least two months after spring ice-out (See NH Administrative Rule Env-Wt 101 for the official state definition). ←

Vernal pools differ from other wetlands in that they have a seasonal cycle of flooding and drying - this cycle determines what wildlife use vernal pools. Many flood then dry each year, though some pools may hold water for several years between drying.

Vernal pools are unique wetlands that provide critical habitat for several amphibian and reptile species. Fish are major predators in wetlands, but they are unable to maintain viable populations in vernal pools (because they dry). As a result, vernal pools provide critical breeding habitat for amphibians whose tadpoles and larvae are especially vulnerable to fish predation. These species include spotted salamanders, blue-spotted/Jefferson's salamanders, state-endangered marbled salamanders, and wood frogs.

Other species besides amphibians use vernal pools. Fairy shrimp are small crustaceans that require vernal pools for all life stages. State-endangered Blanding's turtles and state-threatened spotted turtles feed on amphibian eggs in vernal pools and use them for basking, mating, and overwintering. These turtles also use vernal pools as stop-over habitat when migrating, because pools provide moist refuge and abundant food. Many mammals, birds and snakes also forage at vernal pools, including song birds, wood ducks, ribbon snakes, bats, and raccoons.

While vernal pools are essential habitat for many wildlife species, the forest surrounding the pools is equally important. For example, wood frogs and the salamanders that breed in vernal pools spend ~~over~~ *more than* 11 months in the forest.

### OBJECTIVE

Manage vernal pools and the surrounding forest to provide amphibian, invertebrate, and turtle habitat, by maintaining pool hydrology, water quality, forest floor integrity, and sufficient canopy cover.

### CONSIDERATIONS

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- Many vernal pools meet the statutory definition of wetland and are subject to state wetlands regulations pertaining to timber harvesting.
- Marbled salamanders and Blanding's turtles are listed as endangered, and spotted turtles as threatened species by the state of New Hampshire, and are protected under the NH Endangered Species Conservation Act. The NH Natural Heritage Bureau can tell you if these or other listed species have been documented on or near your property.
- In preparation <sup>for</sup> of a timber harvest, it may be necessary to mark the perimeter of vernal pools when they contain water in the spring, so they can be identified during the dry season or during winter.
- When a vernal pool fills with water, how long it holds water, and the type and abundance of amphibians and invertebrates it supports can all change dramatically from year to year. Animals that use the pools are adapted to this variation. Though some species may not be present at a particular pool in a given year, that pool and its surrounding forest may still be high-quality habitat.
- Although reptiles and amphibians are small, they travel long distances. Juvenile wood frogs and salamanders may disperse to vernal pools as far as 1/2 to several miles from the pool in which they were born. These movements maintain genetic variability within amphibian populations and recolonize sites where local amphibian populations are gone.

which reference offered these measurements not from N.H.

- Both the vernal pool and the surrounding forests are part of the functional vernal pool system, but each serves different functions. Breeding habitat includes the vernal pool basin and a forested buffer extending 200 feet from the pool edge. The pool basin is the physical breeding location for vernal pool-dependent species and is a nursery for their eggs and larvae. The buffer helps protect pool water quality by filtering sediment and pollutants, providing shade, and slowing surface runoff. The buffer also provides leaf litter, which is the foundation of the vernal pool food chain, and shelter for adult and metamorphic amphibians immediately after they emerge from the pool. Core habitat extends from the breeding habitat out to 950 feet from the pool edge. It provides critical habitat for amphibians of all ages during the non-breeding season, and provides aestivating and basking habitat for spotted and Blanding's turtles.

\* [ The lack of long-term studies in the northeast means that much is still unknown about the specific effects of timber harvesting on vernal pool-dependent reptiles and amphibians. Available research suggests the within the core habitat: that

- Excessive compaction or scarification of the soil during timber harvesting may reduce leaf litter and burrows, and reduce the amount of suitable upland habitat available to wood frogs and mole salamanders. Maintaining natural topography maintains the volume and timing of water reaching vernal pools.
- Vernal pool-dependant amphibians and reptiles are most sensitive to ag land disturbances that alter water quality or temperature within the pools, alter the length of time the pools hold water, or alter the air and soil temperature in the forest surrounding vernal pools.
- Wetland buffers intended to protect water quality may be too narrow to allow amphibians to complete all of their life history.
- Negative effects of temporary openings are less in a forested landscape than in a developed one.

19 references on vernal pools - none are from NH or can be identified as such. 2 are from Maine

1 from Northern Logger Magazine. what do you mean by developed? 148  
9/15/2010 9:05 AM

- As forest opening size increases, the negative effects of habitat drying and increased soil and air temperature also increases. However, it is unclear how specifically these impacts change as the disturbance increases from a single-tree opening, to a small group opening, to a large clearcut of many acres. In most cases, the negative effects of timber harvesting on vernal pool-dependant species are temporary and decrease with time as the forest regenerates.
- Canopy cover reduced below 55% will probably have at least a temporary negative affect on vernal pool-dependent amphibians - until the canopy or understory cover fill in. *Percent*
- Openings such as wildlife food plots, pastures, fields, and landings create barriers to reptile and amphibian dispersal because they are often hot and dry. These openings are most likely to create barriers when they are located directly between adjacent wetlands.
- Vehicle ruts can reduce the length of time a pool holds water by directing water away from the pool. Ruts at any distance from a pool can create breeding "traps" for amphibians, since wood frogs and salamanders will often deposit eggs in ruts. Most ruts dry too quickly to allow the eggs to develop completely.

## RECOMMENDATIONS

- Mark the locations of vernal pools before harvest. Alert equipment operators. Locations and management recommendations could be included in the forest stewardship plan. *when feasible*
- Locate openings such as landings, main skid trails, roads, wildlife food plots, pastures, and fields as far as reasonably possible from vernal pools. Avoid locating permanent, non-forest openings directly between two adjacent vernal pools.
- The vernal pool basin:
  - Avoid running machinery through vernal pool basins, even during dry periods, to avoid changing the pool's ability to hold water.
  - Avoid adding slash (woody material) to vernal pools. Where significant amounts of slash fall into the pool, remove it by hand or some other low-impact method. If the pool contains water, leave the slash until the dry season. Removing it when the pool holds water can disrupt amphibian egg and larval development.
  - Avoid removing trees that have crowns immediately overtopping any portion of the pool in order to maintain water temperature and nutrient inputs.
- Within 200 feet of a vernal pool:
  - Limit tree removal to individual trees or small groups of trees. Locate groups where ~~there is established~~ advanced regeneration or shrub cover is established which can help to maintain shady conditions after the overstory is removed.
  - Avoid removing stumps, stones, or other large cover objects.
  - Maintain as much of the existing understory vegetation (i.e., small trees, shrubs, herbaceous ground cover) as possible.
  - Limit the activity of heavy equipment.
  - Locate main skidder roads outside of this buffer.
  - Avoid applying herbicides or insecticides.

- Beyond 200 feet:
  - Limit the area that is scarified, stumped or regraded to that necessary to accomplish silvicultural or wildlife objectives.
  - Retain as much existing dead and down woody material, stumps, stones and leaf litter as possible.
  - Avoid or minimize rutting by following best management practices (BMPs). When possible, harvest on frozen ground (preferable) or in dry summer conditions.
  - Retain as much understory vegetation as possible where its removal isn't required to meet other objectives.

## CROSS REFERENCE

Harvesting Systems; Water Quality; Wetlands

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# Good Forestry in the Granite State: Draft Sensitive Areas - Pine Barrens

## X.X PINE BARRENS

### BACKGROUND

**Pine barrens are a rare, fire-dependent natural community that support unique flora and fauna.**

Pitch pine – scrub oak woodlands, commonly known as pine barrens, are one of New Hampshire's rarest natural communities. These unique forests make up less than half of one percent of the state's landcover. Historically, pine barrens were more prevalent, with large pine barrens ecosystems found in the Ossipee River watershed and lower Merrimack River Valley. Today, they exist as scattered fragments.

Pine barrens are characterized by:

- The presence and preponderance of "hard" pine in the overstory, including pitch pine (*Pinus rigida*) and occasionally red pine (*Pinus resinosa*).
- An understory that can include dense thickets of scrub oak (*Quercus illicifolia*) and low-growing shrubs such as blueberries.
- Grassy openings with herbaceous plants like wild blue lupine (*Lupinus perennis*).

Barrens require periodic and recurring fires for maintenance and regeneration. The plants and animals found in these ecosystems are uniquely adapted to this disturbance. For example, the thick bark of a pitch pine protects the cambium and prevents girdling during a fire. Such adaptations provide a competitive advantage in fire-prone areas. Without periodic burning, species less tolerant of fire can gain a foothold and displace the pine barrens species.

Pine barrens are home to many uncommon species, many of which are restricted to pine barrens habitats. They support more than 50 rare plant and animal species, including a number of rare and declining ground and shrub nesting birds and numerous uncommon invertebrates. Whippoorwill, eastern towhee, and the federally protected Karner blue butterfly are just a few of the well-known, yet uncommon species.

### OBJECTIVE

**Maintain unique pine barrens natural communities for a suite of uncommon wildlife and plant species, and to protect important groundwater resources.**

### CONSIDERATION

- Pine barrens require disturbance to: 1) regenerate pitch pine and other pine barrens species, 2) remove fire-intolerant species, and 3) maintain structural diversity.
- Prescribed burning most closely mimics the natural disturbance regime in pine barrens.
- Plants less tolerant of fire than hard pines are common in many pine barrens due to the

- lack of fire. White pine, American beech, red maple, red and white oak, and aspen are the most common to encroach. These species increase the canopy cover, resulting in changes to the understory. Scrub oaks and other understory shrubs are shade intolerant and decline with increasing canopy cover. Pitch pine regeneration is suppressed by the lack of suitable conditions created by fires for seed germination.
- Uncommon wildlife require the plants and diverse forest structure of pine barrens. Many of the rare invertebrates depend upon just one or two plant species to serve as their host. For example, the caterpillar of the highly uncommon pine pinion moth (*Lithophane lepida lepida*) feeds exclusively on pitch pine needles. Similarly, ground and shrub nesting birds depend upon the patches of bare mineral soil and dense shrubby thickets for nesting.
  - The limited commercial value of pitch pine creates a financial incentive to convert pine barrens to white pine, a species able to grow on these soils.
  - The sand and gravel deposits where pine barrens are found often comprise stratified drift aquifers, which are highly productive areas for groundwater recharge and storage. Stratified drift aquifers are easily contaminated because they lack a protective bedrock cap.
  - The vegetation is highly flammable. Many plants have flammable oils enabling them to burn with high intensity even during the growing season. Without periodic fires, fuels can accumulate to dangerous levels, and wildfires may threaten human life and property and cause significant ecological damage. Because of fire suppression, many pine barrens now have high fuel loads and represent considerable fire hazards during periods of drought.

## RECOMMENDED PRACTICES

- Maintain pine barrens natural communities. Avoid converting them to other forest types.
- Provide a diversity of habitat niches by maintaining heterogeneity in the forest canopy and understory. Maintain forest openings, edges, and dense stands. The understory should include thickets of tall shrubs (e.g. scrub oak), carpets of low growing ericaceous (heath) shrubs, grassy openings, and patches of exposed mineral soil.
- Although prescribed burning may not be practical in all areas, a combination of prescribed burning and mechanical treatments is the preferred disturbance method. In the absence of fire, substitute partial timber harvesting and mowing of shrub layers.
- Use timber harvests to:
  - Remove fire-intolerant species (e.g., white pine, red maple) to favor hard pines and other pine barrens species.
  - Create openings in the canopy, even when the stand is dominated by pitch pine, to promote the shrub layers in the understory.
  - Scarify the soil to promote the regeneration of pitch pine and other pine barren species. Time harvests to coincide with good pitch pine seed years.
- Manage shrub layers to minimize overstory shading.
- Limit the disturbance of any given discrete patch to no more than 20<sup>percent</sup> - 25<sup>percent</sup> in the same year. Leave some areas undisturbed within any 20<sup>year</sup> period. If the patch extends onto other ownerships, coordinate management across ownerships to the extent possible.

- For invertebrates, maintain adequate abundance of food plants, especially scrub oak, pitch pine, blueberries, sweet fern (*Comptonia peregrina*), sand cherry (*Prunus pumila*), pin cherry (*Prunus pensylvanica*), wild lupine (*Lupinus perennis*), and New Jersey tea (*Ceanothus americanus*).
- For whippoorwill and common nighthawk, create areas of reduced litter to provide suitable nesting habitat.
- For shrub nesting birds, provide shrubs high enough for nests <sup>10</sup>3-6 feet above the ground.
- Minimize activities during the breeding bird season (mid-May to early July).
- Prior to conducting management, have a plan for hazardous materials spill prevention and control.
- Reduce fuel and protect neighboring property.
  - Reduce canopy and shrub fuels, especially next to developed areas.
  - Create fuel breaks.
  - Use whole-tree harvesting techniques.
  - Have fire extinguishers available during management activities.
  - Thoroughly check the harvest area for small fires prior to leaving the site. This is particularly important during times of high fire danger in the spring and late summer, especially when the State Fire Class Danger Rating is above 4.
- Contact <sup>N.H.</sup> (NH) Division of Forests and Lands, <sup>N.H.</sup> (NH) Fish and Game, the U.S. Forest Service, the U.S.D.A. Natural Resources Conservation Service, The Nature Conservancy, or UNH Cooperative Extension for information. Prescribed fire can maintain and restore pine barrens, but requires highly specialized expertise, planning, personnel, and equipment.

### CROSS REFERENCE

x.x Natural Communities

### ADDITIONAL INFORMATION

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# Good Forestry in the Granite State: Draft Sensitive Areas - Old-Growth Forests

## 4.8 OLD-GROWTH FORESTS

### BACKGROUND

New Hampshire's old-growth forests are unique, valuable, and endangered natural resources requiring protection and conservation.

The forest that greeted New Hampshire's original European settlers exists today only as scattered remnants. Known as old growth, virgin, primeval, or ancient forests, they escaped harvesting or other human modification over the last 350 years. Carbonneau (1986) identified only 12 old-growth forest sites totaling about 3,000 acres, less than 1/10 percent of forest in the state. More old growth likely occurs as small patches at high elevations and on steep, less accessible areas. Threats to old growth include timber harvests, acid rain, and invasive insects.

Old-growth forests exhibit ecosystem stability and little or no evidence of human disturbance. They have many or all of the following characteristics.

- Abundant old trees with long trunks free of lower branches, deeply furrowed or plated bark, signs of heartwood decay, large prominent root structures, flattened crowns with protruding dead limbs and large thick limbs, and trunks often showing a twist that develops with age.
- Abundant dead and downed logs in all stages of decomposition.
- Abundant moss and lichens on standing trees and downed logs.
- Abundant dead standing trees (i.e., snags).
- Large and small canopy gaps due to fallen trees.
- An undulating forest floor from pits and mounds where trees have fallen and decomposed.
- Multiple vegetation layers (e.g., canopy, understory trees, shrub, and ground cover) and diverse age classes.
- Undisturbed soils, and in some forest types, a relatively thick humus layer.
- The majority of trees are late successional (i.e., shade tolerant trees).
- Multi-stemmed trees (i.e., coppices) are largely absent.
- No signs of human disturbance (e.g., cellar holes, stone walls, wire fence, roads, stumps).

Spruce, hemlock, yellow birch, beech, and sugar maple are the typical canopy species. Second growth or regenerating forests can also develop old-growth characteristics if sufficient time passes to obscure the effects of disturbance. In the northeast, at least 200 years is required to develop old-growth forest structure, although old growth traits begin to develop at 100 years.

### OBJECTIVE

**Preserve and maintain the integrity of existing old-growth stands and allow the development of old-growth characteristics where possible.**

## CONSIDERATIONS

- Managing to retain or develop old-growth characteristics may entail a financial loss.
- Maintaining or restoring old-growth forest requires long-range planning and commitment.
- Establishing small patch reserves or extending harvest rotations helps develop old-growth characteristics in previously harvested stands.
- Forestry professionals, the NH Division of Forests and Lands and the University of NH Cooperative Extension can help landowners identify and manage old-growth forests.

## RECOMMENDED PRACTICES

- Identify and locate old-growth and late-successional forests on managed lands.
- Include old-growth considerations in forest management plans.
- Protect and conserve old-growth stands and allow them to develop naturally.
- Consider restoring areas of old growth within managed forests by allowing stands to develop naturally. Candidate stands include late-successional stands with old-growth characteristics, stands on inaccessible or inoperable terrain, or within riparian management zones. Restored stands should be at least 5 to 10 acres to ensure old-growth structure and function.
- If permanent areas for old growth are desired but can't be established, manage for old-growth attributes by:
  - Deferring cutting one to two rotations (about 80 to 160 years), or otherwise lengthening the rotation.
  - Leaving large-diameter living and dead standing trees and large-diameter woody material on the ground.
  - Using single tree or group selection.

## CROSS REFERENCE

Wetlands and Riparian Areas 2.1; Cavity Trees, Dens and Snags 3.7; Forest Structure 5.2.

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# Good Forestry in the Granite State: Draft Sensitive Areas - High-Elevation Forests

## 4.9 HIGH-ELEVATION FORESTS

### BACKGROUND

High-elevation forests are rare, distinct, and important ecosystems.

High-elevation forests occupy about four percent of New Hampshire. They are relatively undisturbed by human activities. Almost all high-elevation forests are on conservation lands, protected by conservation easements, or subject to zoning ordinances.

Soils are shallow and usually well- to moderately-well drained, nutrient poor, acidic, and fragile. Shallow rooting disposes high-elevation forests to frequent natural disturbance. Windthrow is an important factor in determining forest structure. Patches of wind-induced mortality, called fir waves in balsam fir stands, are common. Moisture levels are high due to increased rainfall, snow, and cloud intercept. Moist conditions support acidic sphagnum forest seeps.

*By compound adjectives ending in ly should not be hyphenated*

A truncated growing season and harsh climate favor slow growing conifers. The NH Natural Heritage Bureau (NHNHB) recognizes three high-elevation communities:

- A high-elevation balsam fir forest community occurs between about 3,500 to 4,500 feet. Balsam fir dominates, although heartleaf birch and red spruce may be present. Moss and liverwort form a deep, spongy carpet over thick humus.
- A high-elevation spruce-fir forest community occurs from about 2,500 to 3,500 feet. Red spruce and balsam fir are the dominant species, with some heartleaf, paper and yellow birch. The woody understory is sparse and mosses and liverworts are abundant.
- Black spruce – red spruce is an uncommon and rare community that occurs from 2,500 to 3,000 feet. Soils are wetter than soils of spruce-fir and balsam fir communities. Black spruce – red spruce communities occur around valley bottom heaths and fens in the White Mountains, and in the North Country.

High-elevation forests are important wildlife habitat. These forests are core habitat for the state threatened American marten and American three-toed woodpecker. New Hampshire is within the range of the state endangered and federally threatened Canada lynx. Lynx are associated with dense, undisturbed boreal forests with a mix of mature conifer stands and shrubby openings. In New Hampshire, signs of lynx are occasionally documented in the White Mountain National Forest. Bicknell's thrush breeding is restricted to montane spruce-fir forests in New Hampshire, New York and parts of Quebec. Wildlife common to high-elevation forests include moose, deer, black bear, fisher, and spruce grouse.

Several rare plants occur in high-elevation forests. The state threatened heart leaved twayblade, lily leaved twayblade and northern comandra occur in spruce-fir and balsam fir communities. The state threatened Pickering's reed bentgrass occurs in acidic sphagnum forest seeps.

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Acid deposition is the biggest threat to these forests as they are within an area of high pH precipitation and high nitrate and excess sulfate deposition. Acidic compounds are 3 to 8 times higher in high-elevation forests than in adjacent low elevation hardwood forests.

## OBJECTIVE

**Maintain the long-term ecological integrity of high-elevation forests.**

## CONSIDERATIONS

- The scarcity of high-elevation forests and their susceptibility to acid deposition, thin soils, sensitivity to physical disturbance, slow recovery, and critical importance to wildlife and natural communities support careful management.
- The Coos County Unincorporated Towns Planning Board designated lands above 2,700 feet in elevation, or with slopes in excess of 60 percent over 10 acres, as Protected District 6 (PD6) zones. Forest management activities in PD6 zones require a permit from the Coos County Planning Board.
- Nutrient-poor soils of high-elevation forests are especially sensitive to the removal of nutrients in wood harvests. Minimizing soil erosion and rainwater leaching through the soil, and leaving branches and needles on-site, can help replenish soil nutrients.
- Shallow, fragile soils render high-elevation forests sensitive to disturbance. Soil erosion and compaction can harm existing trees and limit the potential for stand regeneration.
- Pushing stands to older ages provides a more complex structure for American marten and three-toed woodpecker.
- Leaving mountain ash encourages black bear, American marten, fisher, and numerous bird species who favor the fruits. Moose favor the bark throughout winter months.
- Land below 2,700 feet may exhibit characteristics of high-elevation forests including shallow soils, steep slopes, and spruce-fir dominance. Adapt the following recommendations to lower elevation sites exhibiting high-elevation characteristics.

## RECOMMENDED PRACTICES

- When planning or conducting harvests:
  - Apply best management practices, or more rigorous practices. Refer to *Best Management Practices for Erosion Control on Timber Harvesting Operations in New Hampshire*.
  - Avoid pockets of old growth forest.
  - Layout the harvest during snow-free conditions.
  - As possible, schedule harvests for winter conditions.
  - Avoid removing limbs and tops from the harvest site.
  - Avoid clearcutting.
  - Leave large cull and cavity trees on-site.
  - If planning uncut reserve zones, incorporate prominent ridgelines, game trails, ledge outcrops, older stands, complex stands, wetlands, streams, and seeps.
- Direct management on high-elevation lands towards maintaining or increasing the proportion of softwoods.

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