3. HABITAT CONCEPTS AND FEATURES

By viewing single pieces of property in a landscape context, you will be able to manage your property in a way that benefits wildlife beyond your own property boundaries.

Wildlife habitat is defined as the places where animals live, find food, mates and meet their life needs. Habitat occurs at several scales, and you will need to understand each of these to properly plan for successful habitat management and conservation. As noted in the previous chapter on Biophysical Regions of Vermont, habitat occurs at the landscape scale in the form of large areas of intact, contiguous forest and the connections between these large forest blocks. Habitat also occurs at the community scale where assemblages of plants and animals come together to create a wide array of natural communities and habitat conditions such as black spruce swamps, dry oak forests, or floodplain forests, to name only a few. And lastly, it occurs at the fine scale, where individual species utilize dead trees (snags) for nesting cavities, forested seeps for foraging habitat in spring, or an area of concentrated American beech trees as an important fall feeding area. You should consider all three scales when developing a plan for wildlife habitat management, even if the plan only affects habitat conditions at the fine scale.

Wildlife do not recognize property boundaries and may require habitat that extends across lands owned both publically and privately. Habitat features such as stream corridors, ridge lines, or contiguous forests connect individual properties into the broader landscape. By viewing single pieces of property in a landscape context, you will be able to manage your property in a way that benefits wildlife beyond your own property boundaries.

This chapter will provide context and help you understand habitat concepts that are important for developing effective management plans. This will be useful when you inventory habitat conditions on your land and develop realistic management goals and objectives.

HABITAT CONCEPTS

The following information will help to define important habitat concepts:

Habitat is the natural area inhabited by an animal, plant, or other type of organism. The basic elements of habitat include food, water, and shelter. Habitat is also a function of the physical environment related to factors such as temperature, elevation, soil condition, and hydrology. Habitat occurs at several scales including the landscape scale (e.g., large areas of contiguous forest), the community scale (e.g., deep rush marshes), and the fine scale (e.g., snags and logs).

Natural communities are groups of plants and animals that recur across the landscape wherever similar environmental conditions occur, including climate, soils, bedrock type, slope, and water. Many natural communities are common in Vermont and are easily recognized, such as northern hardwood forest, spruce-fir forest, cattail marsh, and alder swamp. Others are uncommon or rare, such as clayplain forest,

northern white cedar swamp, and rich fen. Natural communities are useful for understanding the ecological variations on the land and are an important tool for planning land management and conservation. Many natural communities are closely associated with the habitat needs of specific wildlife species. For more information on natural communities, see examples in **Chapter 5, "Managing with a Focus on Natural Communities"** and in **Resources** at the end of this chapter for Thompson and Sorenson's *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont*.

Here are a few examples of strong associations between natural communities and wildlife species in Vermont:

- Spruce grouse rely on lowland spruce-fir forests and interspersed black spruce swamps.
- Timber rattlesnakes use warm talus slopes for critical basking and hibernacula habitat.
- Bicknell's thrush and Blackpoll warbler rely on Vermont's high-elevation montane spruce-fir forests.
- Several species of rare and common dragonflies and damselflies occur only in poor fens and dwarf shrub bogs with some open water.
- Hemlock forests are one of the most important forest types providing winter cover for white-tailed deer.

Natural communities are useful for understanding the ecological variations on the land and are an important tool for planning land management and conservation

Species diversity is the number of species, subspecies, and genetic variants of animals, plants, and other organisms in a given area. Promoting **native species** is an important component of any management plan along with protecting those that are rare regionally and statewide.

Some nonnative **invasive species,** such as house sparrows and European Starlings, are abundant near human habitation and compete with native birds for habitat. Invasive nonnative species are a serious threat to wildlife, habitats, and ecosystems in Vermont. Some invasive plants, such as honeysuckle, buckthorn, and purple loosestrife can be introduced by poorly planned land management activities. You should make every effort to remove these and other nonnative species if they become established. For more information, see "Saving Our Open Space: Effects of Urban Sprawl" in **Resources**.

Structural complexity refers to the variation of size and age classes and spacing of trees (both living and dead, standing and down) and other plants. Increasing the structural complexity of forested habitats, for instance, can increase the diversity of wildlife that use an area because it creates more fine-scale habitats within the forest.

Even- and uneven-aged forest conditions are important factors to consider when planning for forest wildlife habitat management. Even-aged forest habitat refers to forest habitat where the majority of the trees within a stand, habitat or area of interest are generally the same age. Even-age management is an important objective for developing habitat for species such as ruffed grouse, American woodcock, chestnut-sided warbler, and snowshoe hare, among many others. Uneven-aged management, on the other hand, refers to forest habitat where there is a wide distribution of ages among the trees in a stand, habitat or area of forest. This condition is important for many forest-interior songbirds such as scarlet tanager, black-throated blue warbler and oven bird. Following clearing or other forest disturbance, a forested area will regenerate as an even-aged forest, with most trees within 10 years of age of each other. In an old forest, individual trees die and create openings; in turn they are replaced by new

or suppressed trees that grow up in the opening, resulting in an uneven-aged forest. Silvicultural techniques can be used to produce either an even-aged or an uneven-aged forest. In the absence of natural events such as fire and blowdowns, silvicultural techniques such as patch cuts may be appropriate to increase the diversity of species and ages of trees within a larger forested area and create patches of early successional habitat to mimic natural gap formation and encourage species associated with early successional forest. The book, *More Than a Woodlot*, provides an excellent overview of these concepts and how to apply them to forest habitat management.

Forest fragmentation is a condition caused by breaking up large forested blocks into smaller, isolated forested areas, often surrounded by residential development, commercial development, or agricultural (e.g., row crops). Many wide-ranging species, such as black bear and moose, need large areas of unfragmented forest habitat and this should be considered in your management plan. Forest interior songbirds, such as the hermit thrush — the Vermont State Bird, are affected by fragmentation due to increased rates of nest predation and parasitism associated with the fragmentation. For more information, see the link for Threats to Vermont's Natural Heritage in **Resources**.

Rare, threatened, and endangered species are species of plants, animals, and fungi whose populations are low or are at risk of becoming extirpated or extinct. Species listed as "threatened" or "endangered" are legally protected under Vermont's Endangered Species Law or the Federal Endangered Species Act. In both cases, the laws prohibit harming or disturbing the listed species. Many of these species occur in specialized habitats or uncommon natural communities, or have experienced significant habitat loss over time. Rare species (those with low population levels) have less legal protection, but they still provide an important contribution to species diversity in Vermont. The ANR Natural Resources Atlas (see **Resources**) is a web-based GIS mapping tool that provides access to information on the approximate location of rare, threatened, and endangered species.

A Buffer is a designated area surrounding an important habitat feature, such as a stream or wetland, in which the integrity of the plants and soils are protected. Buffers reduce the impacts of activities occurring outside the area. Buffer width and specific management practices within a buffer will vary with the habitat feature being protected. Buffers incorporated for forest management don't always assume a hands-off approach and certain habitat benefits can be realized through careful management of trees within buffers (e.g., creating snags, providing downed woody material as habitat). Some buffers provide important habitat functions in and of themselves, such as riparian habitat along rivers and streams that provide nesting and feeding habitat for northern orioles, yellow warbler, and wood ducks as well as travel corridors between larger areas of habitat for black bear, otter and mink.

If you suspect that a rare, threatened, or endangered species may occur on your property, please contact the Vermont Fish and Wildlife Department. The department can provide specific management guidance to help you protect these important species on your property.

FINE-SCALE HABITAT FEATURES

The following information will help to define important habitat features.

Lakes, ponds, rivers and streams are aquatic habitats that are essential for many species of fish and wildlife. To protect aquatic habitats from erosion, bank slumping, sedimentation, and loss of shade, buffers should be established along the edges of these aquatic habitats. Buffers should be largely undisturbed, naturally vegetated areas extending from the edge of the aquatic habitat feature. While buffers should always be treated with great care, there may be instances where active management is important such as when dealing with invasive species, pathogens, pests, and overall forest health concerns. Fisheries and wildlife biologists in the Vermont Fish and Wildlife Department can help you plan for the conservation of these important features. Buffers should be applied to both sides of stream channels and, in the case of wetlands, around the perimeter of the wetland.

In addition to protecting water quality and aquatic habitat, buffers also provide nesting and brooding cover for birds and travel corridors for bobcat, fisher, otter, and other wildlife that depend specifically on wetland and stream habitat. Although buffer widths and dimensions will vary depending on the conditions of the aquatic habitat or other features, in general, maintaining a relatively wide buffer will maximize those wildlife benefits as well as other ecological benefits such as streambank and lakeshore stabilization. Most streams require a minimum of 50 feet for a buffer to protect the aquatic functions. However, to protect the wildlife functions along a stream corridor, it is often necessary to protect a buffer width of up to 660 feet. For more information on buffers and how to plan for appropriate widths see **Chapter 14 "Riparian Habitat Management**."

If possible, the ideal buffer strip should extend at least 100 to 300 feet from water. It is important to be realistic when establishing buffers and understand that it can limit certain management activities. If the landowner has an interest in timber production as part of their habitat management plan, it may be necessary to find room to accommodate those interests.

Wetlands include swamps, marshes, bogs, and seasonally flooded areas which are extremely important to wildlife. The Vermont Wetland Rules regulate activity within wetlands and within a buffer zone around any wetland that provides significant functions and values (including wildlife habitat) as designated by the Wetlands Section of the Department of Environmental Conservation. Buffer zones are also recommended for any wetland that is determined to provide important wildlife habitat functions, including small forested wetlands. While the Vermont Wetland Rules typically require a 50-foot buffer around wetlands, many species will benefit from larger buffers. For instance, American bitterns require wetlands with buffers greater than 300 feet from development to avoid displacing those birds from suitable nesting and feeding habitat. Beavers may search out food supplies several hundred feet from a wetland.

In areas where agriculture is in close proximity to wetland habitats, fencing can restrict livestock from damaging plant stems and roots. Keeping livestock away from wetlands helps to prevent manure from contaminating water with nutrients that cause algal blooms that reduce the value of wetlands for a wide array of wetland dependent wildlife.

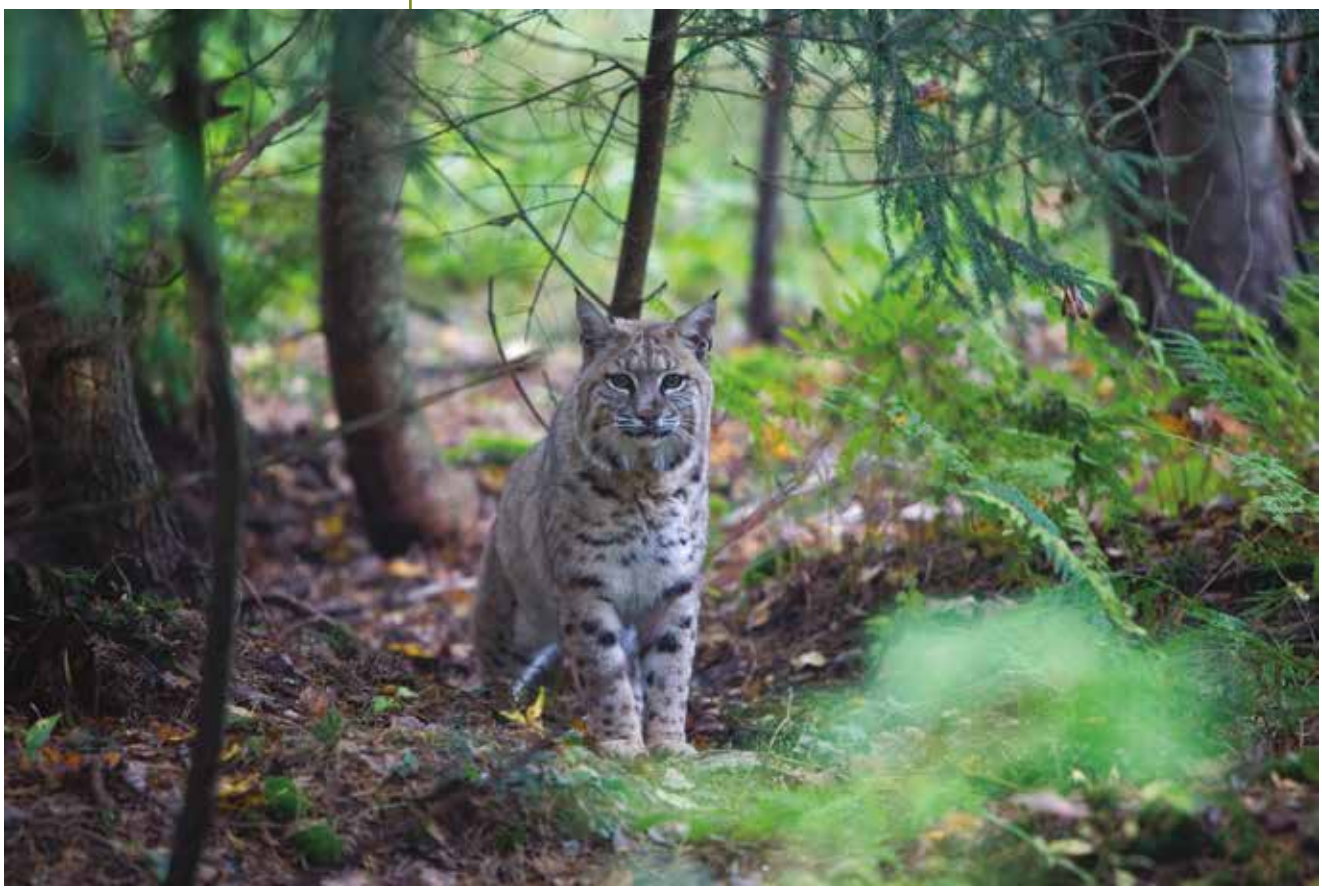
Some buffers provide important habitat functions in and of themselves, such as reparian habitat along rivers and streams that provide nesting and feeding habitat for northern orioles, yellow warbler, and wood ducks as well as travel corridors between larger areas of habitat for black bear, otter, and mink.

In terms of the overall landscape in Vermont, open habitats are a smaller percentage of the landscape and merit attention when you are planning for habitat management.

Naturally occurring logs, branches, and stumps in and around wetlands provide important basking, feeding, and refuge sites for turtles, frogs, and snakes. Cedar, locust or other rot-resistant wood are all excellent choices for constructing waterfowl nest structures, rather than using chemically treated wood. For more information on wetland management, refer to **Chapter 25, Waterfowl** and **Chapter 12, Wetland Habitat Management.**

Springs and seeps are small wetlands usually found within forested habitats. The shoots that emerge there in early spring provide an important source of food for many species of wildlife, as well as a reliable source of water and succulent plants during the summer. These features are also an important source of cold water for streams and rivers, and play an important role in maintaining aquatic habitat for species such as brook trout.

Vernal pools are temporary woodland pools that are especially important to breeding salamanders and frogs because, unlike in other wetlands, fish that eat eggs and larvae are absent in these pools. When standing water is absent, vernal pools can be detected by land depressions with matted, water-stained leaves. In general, a 100-foot buffer is recommended to protect these habitats from ground disturbance and to maintain shade. An additional limited buffer is recommended to 600 feet, in which timber is carefully harvested to minimize soil disturbance and at least 70 percent crown closure of the tree canopy is maintained. Avoid placing landings, roads, slash, or operating heavy machinery in the pool habitat in order to avoid destroying the conditions of the pool. Refer to **Chapter 12, Wetland Habitat Management** for more specific information on management recommendations.



Openings are both naturally occurring and man-made. These areas — such as beaver meadows, meadows, and rocky outcrops — all provide important wildlife habitat. While not every species may use these openings, they are a valuable habitat for many species. Maintaining these areas where they already occur is a great habitat management technique. Avoid creating openings where they will fragment large areas of forest in order to minimize the effects of predation and nest parasitism to nesting forest interior songbirds, minimize the risk of wind damage to forest stands, and minimize the risk of weed and invasive plant invasion.

These sort of open habitats are an important condition for many types of wildlife such as eastern towhee, golden-winged warbler, American woodcock, bobcat. In terms of the overall landscape in Vermont, open habitats are a smaller percentage of the landscape and merit attention when you are planning for habitat management. Location is critical when planning for this type of habitat and must be considered in the broader context of landscape habitat conditions to ensure that the location is suitable and appropriate to manage for these habitat conditions. Keep in mind that if you're enrolled in UVA, the creation of large openings, generally 20 acres or more, will likely require amendments to your UVA plans.

Mast trees, such as oak, beech, hickory, and apple, provide many species with critical sources of nutritious food. Species that are attracted to mast crops include chipmunks, evening grosbeaks, turkeys, ruffed grouse, deer, squirrels and bears. Because "hard" mast trees like oak and beech don't produce viable seeds until at least 25 years of age, preserving mature trees is important. Beech trees with bear claw marks are a clear indication that those trees have a reliable history of nut production. Cutting away shrubs and other trees that are crowding and shading apple trees is a good way to extend the productive life of these important "soft" mast trees. Other soft mast sources include cherries, mountain ash, blackberries, and raspberries. For more information on managing mast habitat, see **Chapter 20, "Black Bears"** and **Chapter 10, "Apple Tree and Soft Mast Shrub Management"** within **Part Three: Managing for Production of Wildlife Food Resources**.

Heron rookeries are home to great blue herons, which often nest in colonies ranging in size from a few nests to hundreds. You can recognize these rookeries by the presence of large stick nests typically found in trees on islands, wetlands, or hillsides. Rookeries may be used for decades or even centuries; rookeries in dead trees flooded by beavers persist for shorter periods of time than rookeries in live trees. Intact trees and uncontaminated adjacent wetlands or shallow waters are important. If nests are disturbed, herons may desert their individual nests or the entire rookery, or young birds that are alarmed may fall from the nests to their death.

Different kinds of buffers are recommended for protecting heron rookeries:

- A *primary* buffer zone of 300 feet from the outermost nest trees in a rookery should exclude tree harvesting, roads, trails, and building construction year round and should exclude hiking, hunting, fishing, and camping outside the nesting period. Do not allow human intrusion to occur between the March 15 and August 1 nesting period.
- A *secondary* buffer zone from 300 to 650 feet from the rookery perimeter should exclude sand or gravel extraction, land clearing, and construction of permanent structures or roads. Other activities to avoid

Beech trees with bear claw marks are a clear indication that those trees have a reliable history of nut production.

Try to leave two or more large den trees per acre within 300 feet of lakes and ponds to accommodate cavity-nesting ducks and other larger cavity users.

between March 15 and August 1 are temporary road construction, timber harvesting, and ATV use. To be clear, this area does not preclude timber harvesting, but those activities should be timed appropriately and planned and implemented to avoid impacting the hydrology of the habitat. Existing farming operations, including maple sugaring and the use of existing paths by non-motorized traffic, are unlikely to result in adverse impacts at this distance during the nesting season.

- You might also consider a *tertiary* buffer zone 650 to 1300 feet from the rookery perimeter. Construction of small buildings, temporary roads, and timber harvesting may be feasible outside the nesting period.

Raptor nest trees are home to forest hawks and owls. To protect the large stick nests of these birds, provide buffers around the nest trees during timber harvests. Avoid harvesting timber within the buffer during the nesting season (typically April through June). The buffer should be equal to or greater than the height of the tallest tree within 20 feet of the nest. Be sure to drop all harvested trees away from the nest tree.

Avoid creating large openings or clearcuts within 300 feet of a raptor nest to avoid isolating and exposing it to predators. An isolated raptor nest tree is more vulnerable to predators such as raccoons, which may force raptors to abandon these nests. When large areas are cut, leaving some large trees or clumps of trees for perches and future nest trees is important. You can do this by designating one or more trees 12 inches or greater in diameter at breast height per acre wildlife trees. These trees need not be high-quality timber, and culling trees with profuse branching may be appropriate.

Den trees and snags are living or dead upright trees with cavities or dead limbs that provide important habitat for a variety of birds and mammals. These trees are especially important to wildlife, especially when located near water. Among the many wildlife species that benefit from dead and dying trees are some of Vermont's now rare bats who use the loose bark and cavities to roost. Standing dead trees may also pose a risk to human safety, so you should consult with a professional forester or wildlife biologist who is familiar with the Vermont Occupational Safety and Health Administration's guidelines on logging before planning a harvest in or near unsound trees. To address safety issues, consider clustering cavity and snag trees in areas such as riparian zones and wetlands, and away from access roads and trails. If a den tree or snag must be felled for safety reasons, leave the material on the ground as important downed wood habitat.

To recognize trees that provide cavities used by wildlife for dens, look for broken-off tops and large branches, old scars, conks, and existing cavities. Hardwood trees with cavities closer to the top of the tree are ideal. When possible, leave a selection of different diameter den trees for cavity-using wildlife. Tree cavities near open water, including some wetlands, will also be used by wood ducks, common goldeneyes, hooded mergansers, and common mergansers. Try to leave two or more large den trees per acre within 300 feet of lakes and ponds to accommodate cavity-nesting ducks and other larger cavity users.

Snags, or standing dead trees, may also serve as den trees. They provide perches and feeding sites for insect-eating birds such as woodpeckers, nuthatches, and black-capped chickadees, and feeding as well as resting sites for some snakes. Try to retain as many of these trees as possible while observing human safety concerns. When snags are infrequent or absent in a forest, consider girdling trees or leaving unhealthy trees to eventually become snags.

Live trees showing signs of reduced vigor, broken limbs, or scars may be good candidates for replacement snags. This may be especially important in young stands. To maintain the maximum number of downy woodpeckers in the northeast, the U. S. Forest Service reported that four snags of 6-inch diameter or greater should be maintained per acre. Guidelines in Maine use this same ratio as a "rule of thumb" for den trees and snags combined for all wildlife, but suggest maintaining one tree greater than 18-inch diameter, two trees 14- to 18-inch diameter, and three trees 6- to 14-inch diameter per acre when circumstances allow. As with many management prescriptions, your personal analysis of the on-site situation is very important in deciding what makes the most sense. Exceeding these recommendations will likely benefit wildlife, and providing fewer snags will likely reduce the wildlife habitat benefits.

Try to leave six or more snags with 15 inch or greater diameter within 300 feet of openings, ponds, and lakes. Snags near openings may be used as hunting perches by the Eastern bluebird and red-tailed hawk. Snags near open water, even those with small diameters, may develop cavities used for nesting by tree swallows. All snags and den trees have wildlife value, but larger snags can provide for a wider range of wildlife species and may provide more wildlife value for longer periods of time.

All snag and den trees have wildlife value, but larger snags can provide for a wider range of wildlife species and may provide more wildlife value for longer periods of time.

The following are management recommendations for maintaining and managing for den trees and snags:

- Manage for at least six cavity, snag, and/or decadent, living trees per acre on average, with one exceeding 18-inch diameter breast height (DBH) and three exceeding 16-inch DBH.
- Leave trees that have cavities of varying sizes and are located in the upper trunk of the tree. Also, give priority to hardwood trees with cavities, rather than softwood, as they remain intact longer.
- To address safety issues, consider clustering cavity and snag trees in areas such as riparian zones and wetlands and away from access roads and trails. Over time, these will become downed woody material and provide additional, long-term ecological benefits to fish, wildlife, and forest health.

Exposed perches are large exposed branches and isolated or tall trees that provide perch sites for raptors and other birds. However, brown-headed cowbirds, a grassland species that invades forests to lay their eggs in the nests of other birds, benefit from perches offering good vantage points to scan the area for nests. Avoid leaving exposed perches when forests are fragmented and there is nearby farmland that provides grassland habitat and livestock feed for cowbirds.

In most situations you should leave naturally downed trees where they fall.

Stumps provide feeding and den sites for small forest-floor animals such as mice, voles, shrews, chipmunks, squirrels and even weasels, which will use the decaying root system as ready-made tunnels.

Course woody material, such as logs, provides display sites for ruffed grouse, travel lanes, and important microhabitats for small mammals, salamanders, frogs, fungi, and overall forest health (nurse logs for tree regeneration). Larger logs provide greater value to wildlife because they persist for many years. In particular, large hollow logs used as shelter or denning habitat only come from large, standing hollow trees, so the best way to create this habitat is to let large trees grow, decay, and fall naturally. Fallen trees, decomposing logs, bark slabs, and slash all serve as important habitat features for small mammals, salamanders, snakes, and nesting wild turkeys.

Trees that naturally fall into wetlands, lakes and ponds, and rivers and streams are beneficial to wildlife for shade and cover. In most situations you should leave naturally downed trees where they fall. In contrast, slash and other logging debris can create negative impacts to aquatic habitats. Leaving an unmanaged buffer zone along a waterbody will provide an appropriate amount of downed wood for the aquatic habitat.

Brush piles, including treetops and other slash, provide roost and nest sites for some birds, cover for chipmunks and rabbits, and may provide a safe spot for a newborn fawn. Animals as large as bears use brush piles in remote forested areas for denning. In addition to providing habitat values, slash returns nutrients to the forest floor as it decomposes and can retard over-browsing by "locally over-abundant" deer and moose. However, slash in streams can disrupt water flow and cause sedimentation problems and should be removed during timber harvest operations.

Rock piles such as stone walls, old foundations, and other exposed rocks provide cover and microhabitats used by small, forest-floor mammals, reptiles, and amphibians. Some of these sites are valuable as cultural resources in addition to their wildlife habitat value.

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