



Woodland Information Sheet

Missouri Information Sheet

IS-MO-643Woodland

Natural Resources Conservation Service (NRCS)
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Missouri Conservation Practice 643

Restoring and Managing a Woodland

What is “Woodland”?

The word “woodland” is more than another general term for a forest. Ecologically, true woodlands are a type of wooded community characterized as having a canopy cover of 30 to 80%, a poorly developed understory, and a diverse herbaceous layer of forbs, grasses, and sedges with 50 to 100% ground cover. Woodlands contain fire tolerant trees such as oak and hickory, often with wide spreading crowns. In parts of the Ozarks, short-leaf pine is a common woodland canopy tree. A variety of other fire tolerant trees also occur in woodlands.

Unlike forests or the altered woodlands we see today, high quality woodlands contain a diverse ground flora of herbaceous plants, shrubs and vines. Common shrubs and vines include lowbush blueberry, aromatic sumac, New Jersey tea, grape, and Virginia creeper. Characteristic herbaceous plants include little bluestem, big bluestem, wild rye, bottle brush grass, poverty grass, tick trefoils, wild bean, goat’s rue, dittany, bristly sunflower, goldenrods, asters, and a variety of sedges.

Prior to European settlement, woodlands were maintained by fire which was set by Native Americans or lightning strikes. Historically, woodlands may have been as small as a few acres to well over 10,000 acres. Today, large tracts of altered woodland occur throughout the Ozarks. In northern Missouri only fragmented pieces of degraded woodland still remain. Most woodland communities have been degraded due to extensive logging, fire suppression, overgrazing and other unnatural disturbances. In the absence of fire, woodlands may succeed to an overstocked, closed canopy community with little ground flora. Eastern red cedar is a good example of a tree that invades woodlands where natural fire regimes have been suppressed. A degraded woodland will often appear similar to a forest community because of a closed canopy and lack of ground flora. This is especially true on more productive woodland sites.

Other threats to woodland communities include conversion for agriculture, feral hogs, unmanaged logging, and invasive plants such as sericea lespedeza, amur honeysuckle and wintercreeper. Fortunately many altered woodlands can be restored to improve plant and animal diversity by excluding livestock (if present), opening the overstory canopy and reintroducing prescribed fire.



A prescribed burn has been completed 5 out of 9 years on this managed upland woodland in Cole County. The results of frequent prescribed fire are a lush ground flora of forbs, grasses and sedges. Post oak, black oak, white oak and mockernut hickory are the dominant overstory trees.



This bottomland woodland in Linn County is dominated by swamp white oak, bur oak, shellbark hickory and pecan with a rich understory of wild ryes, sedges and wildflowers.



Well managed woodlands provide excellent habitat for wildlife. Species commonly associated with woodlands include white-tailed deer, southern flying squirrel, wild turkey, whip-poor-will, scarlet tanager, red-headed woodpecker, Cooper's hawk, Indiana bat, three-toed box turtle, northern fence lizard, and eastern gray treefrog. Many native plants are endemic to high quality woodlands.

Different Types of Woodlands

Woodlands vary in plant composition and canopy coverage based on soil, geology, topography, and fire frequency. A variety of different types of woodlands occur throughout Missouri in both upland and bottomland landscapes. Woodlands are often closely associated with other natural communities such as forests, savannas, glades and prairies.

Generally as soils become thinner and less productive (also drier), woodland trees develop a more open, wide spreading canopy. On shallow upland soils and west and south-facing slopes post, white, chinquapin, black, and blackjack oak, as well as black and mockernut hickory and short-leaf pine (in the Ozark highlands) are the dominant overstory trees. Usually, white oak becomes more abundant in woodlands as soil moisture and productivity increases (mesic woodlands). Herbaceous ground flora varies considerably in upland woodlands depending on soil moisture and the amount of sunlight reaching the woodland floor. Native lespedezas, asters, warm-season grasses, cool-season grasses and sedges are common upland woodland plants.



In bottomland woodlands bur, white, swamp white oak, and mockernut and shellbark hickory are common canopy species. Native cool-season grasses and sedges are the dominant herbaceous plants in many bottomland woodlands. Bottomland woodlands were once common throughout north Missouri and along larger streams and rivers in south Missouri.

A unique type of woodland called flatwoods occurs on broad level plains and in sinkhole basins. Flatwoods contain a dense claypan or fragipan layer that restricts tree growth. Plants found in flatwoods must be adapted to extremely wet and dry conditions due to the impermeable subsoil layer. Post oak is the dominant canopy tree in most flatwoods in southern Missouri. Black jack oak and black hickory are also common. In northern Missouri pin oak is the dominant flatwood tree.

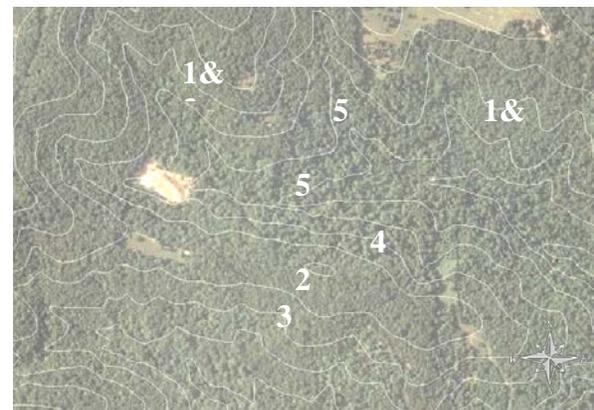
Flatwoods occur in the on broad plains with a claypan or fragipan. The heavy layer restricts tree growth and can be excessively wet or dry depending on the season.

Restoring Woodlands

Woodland restoration often begins with thinning the existing woodland canopy and reintroducing prescribed fire to restore the once diverse plant community. Exclude livestock from woodlands where they currently have access.

Thinning Woody Vegetation in Woodlands

In many cases, to restore a woodland the overstory canopy will need to be thinned. Reduce the canopy coverage by cutting or girdling overstory trees. Avoid using a bulldozer or tree clipper to remove woody vegetation, as heavy machinery may cause soil erosion, compaction, and damage remaining trees and desirable ground flora. Remaining canopy coverage over the entire woodland should range from 30 to 80% depending on the soil type, slope, and aspect of the woodland being restored. Upland woodlands on drier, shallower soils will typically have a more open canopy while mesic and bottomland woodland canopies may have a greater canopy coverage. As a rule, woodlands should have a more open canopy on south and west facing slopes, adjacent to glades or savannas and on gently rolling landscapes. Generally, woodlands on north and east facing slopes, in protective ravines, deeply dissected hills and in moist areas should have a more closed canopy. These sites may also be a forest stand within a woodland community and should be managed differently than true woodlands



This woodland in Maries County should be thinned the heaviest on south and west-facing slopes (1), on broad ridge tops (2) and around degraded glades that should also be restored (3). Thin less on east and north facing slopes (4) and in protective coves and ravines (5).

The remaining canopy trees should consist primarily of larger diameter oak and some hickory. In parts of the Ozarks short-leaf pine is the dominant woodland canopy tree and should be left or reestablished if absent. Other species should be left in lesser amounts for greater plant diversity.



A forester treating a maple with the frill or “hack and squirt” method. After simply cutting the tree, the cut is sprayed with an herbicide.

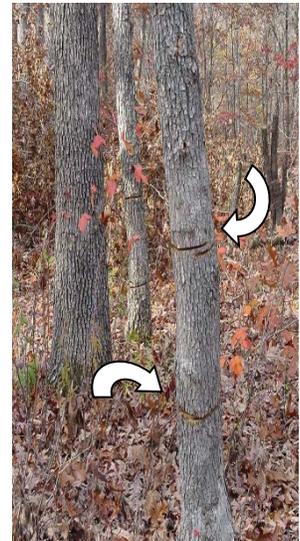
Focus on removing low quality overstory and understory trees and eastern red cedar from the woodland. Frequent prescribed burning should control most small diameter trees. Trees to be cut can be felled, girdled, or frilled. When girdling a tree, cut the tree with a chain saw one to two inches deep all the way around the trunk. Two girdles, 6 to 12 inches apart, are more effective than a single girdle. Small diameter trees (less than 6 inches in diameter) can be treated with the frill or hack and squirt method. This technique simply involves cutting the tree at breast height with a hatchet and then treating the cuts with an approved herbicide. For most species, it takes about one cut for every 3 inches of trunk diameter.

Almost all degraded woodlands will require some thinning to allow sunlight to hit the forest floor and encourage herbaceous growth.

Treat stumps, frills, and girdles of undesirable trees such as hickory, locust, elm, maple, or non-native trees with an approved herbicide to prevent resprouting. Avoid applying herbicides during periods of heavy sap flow (late winter – spring). There is no need to treat the stumps of eastern red cedar. Consult with your local forester or biologist on the recommended thinning

level, trees to be managed, and other recommendations.

Cut trees can be left to burn or removed for firewood. Remove cedar slash away from the trunks of desirable woodland trees to prevent damaging or killing the tree, or allow the cut cedar to cure for 1 or 2 years before burning. Cedar slash and other violate fuels should be moved at least 50 feet away from firebreaks. Over time, prescribed burning will remove most of the dead woody vegetation.



Double girdling a tree is faster than felling the tree and more aesthetically pleasing since most of the trees are left standing. Over time, girdled or frilled trees will decay and eventually fall to the woodland floor.



For existing woodland communities reduce current stocking to levels shown in the following chart:

Average tree diameter (canopy trees only)	Trees per acre (30 % canopy)	Trees per acre (40 % canopy)	Trees per acre (50 % canopy)	Trees per acre (60 % canopy)	Trees per acre (70 % canopy)	Trees per acre (80 % canopy)
4	160	210	260	315	370	420
6	80	110	150	180	210	240
8	60	75	100	120	140	150
10	40	50	60	80	90	100
12	30	35	50	60	70	80
14	20	30	40	45	55	60
16	15	20	30	35	40	45
18	13	15	20	25	30	35
20	11	10	15	20	25	30

NOTE: These numbers represent full crown development.

Guidelines will approximate a 30 - 80 percent canopy cover for any given average tree diameter. As stands move into larger diameter classes additional removals may be necessary to maintain desired canopy cover (trees/acre). Use UPLAND WILDLIFE HABITAT MANAGEMENT (645) for woody cover manipulation recommendations. Treat all cut stumps with appropriate chemicals to prevent re-sprouting. The choice of canopy tree species should be based on slope position/percent, aspect, geology, tree health, fire resistance and soil type.

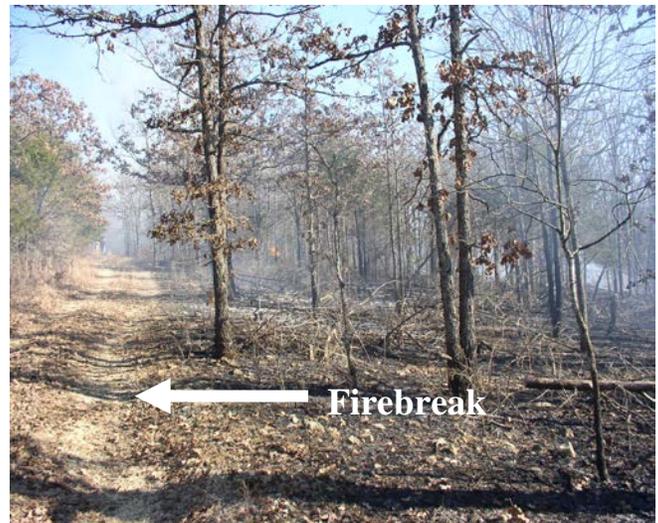
Reintroducing Prescribed Fire

Reintroducing prescribed fire is essential to restoring a diverse woodland community. Fire will suppress small diameter woody vegetation, remove leaf and woody litter and stimulate herbaceous plant growth on the woodland floor. Frequent prescribed burns, on a 1 to 3 year rotation, will be necessary for the first 10 to 20 years to suppress woody sprouts and restore the rich ground flora of forbs, grasses and sedges. Continue to use prescribed fire on a 2 to 6 year rotation to maintain a diverse woodland community once the desired vegetative response has been achieved. Fire intervals greater than 6 years may allow woody sprouts enough time to out grow fire flame heights and eventually succeed back to a closed canopy woodland.

Never conduct a fire in a woodland without a prescribed burn plan.

Historically woodlands burned between September and April, with most fires occurring in late summer through late fall. Burning between September and February will favor native forbs, sedges and cool-season grasses. Fall and winter burns are not as effective at controlling woody sprouts and will only top kill small diameter trees. Fall or early winter is also a good time to burn cedar slash since dormant season fires are usually not as hot or violate as spring burns.

Prescribed burns conducted in the spring will favor native warm-season grasses and suppress woody vegetation, forbs and cool-season grasses. Spring burns are usually hotter and more intense than dormant season burns because of dry fuels and violate weather conditions. Late spring burns after leaf out may cause higher tree mortality. Over time, vary the season when you conduct a prescribed burn to improve plant diversity. Consult with a forester or biologist on when would be the best time to conduct a prescribed burn in your woodland.





To assist with prescribed burning, a permanent firebreak or service road can be used for a firebreak. The width of a permanent firebreak should be at least 2 times the height of vegetation to be burned and should encircle the entire woodland. Permanent firebreaks can be constructed using a chainsaw, small dozer, and/or skid-loader. Avoid constructing permanent firebreaks across natural features such as glades, fens or other unique features. Where possible, construct permanent firebreaks parallel with the contour to reduce erosion. Permanent firebreaks should be cleared of debris prior to conducting the planned burn. A team of two or three individuals with leaf rakes and leaf blowers can quickly prepare a woodland firebreak.

Introducing fire may lower the quality of wood products that are produced from woodlands. Care should be taken to avoid have volatile, hot burning fires.

Other Management Recommendations

Invasive plants such as autumn olive, sericea lespedeza, Japanese honeysuckle, and amur honeysuckle may be a problem in woodlands near roads or urban areas. Scout woodlands regularly for invasive plants and treat immediately when found. If possible, restore or manage other natural communities such as glades, savannas, fens, and forest that may be closely associated with woodland complexes. Consult with your local biologist or forester for information and management recommendations for other natural communities.

PRIMARY HABITAT CONSIDERATIONS:

- RESTORATION and MANAGEMENT of RARE or DECLINING HABITATS (643).
- Provide natural food and cover for many declining animal species.

References:

Nelson, Paul W. 2005. The Terrestrial Natural Communities of Missouri. Produced by the Missouri Natural Areas Committee. 550 pp.

For additional information on woodlands, contact your local USDA Service Center or Missouri Department of Conservation office.

Photos courtesy of the Missouri Department of Conservation. 2005.

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