Planting and Care of Fine Hardwood Seedlings

Hardwood Tree Improvement and Regeneration Center
North Central Research Station
USDA Forest Service
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Designing Hardwood Tree Plantings for Wildlife

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Woody plants can be of value to many wildlife species. The species of tree or shrub, or the location, size, and shape of planting can all have an impact on wildlife. The purpose of this paper is to discuss the benefits of trees and shrubs for wildlife and how to design tree and shrub plantings for wildlife. Some of the practices may conflict with other management goals and may have to be modified for individual priorities.

Trees and Shrubs for Wildlife

The species you select for a tree planting should depend on the growing conditions of the site and the wildlife species that you want to manage. Talk to a professional forester to help you select the tree species best suited for your growing conditions. A professional biologist, such as a Department of Natural Resources District Biologist (www.in.gov/dnr/fishwild/huntguide1/wbiolo.htm), can assist you with planning a tree planting for wildlife.

There is no specific formula for developing wildlife habitat. For example, acorns are eaten by a wide variety of wildlife species including tree squirrels, pheasants, wild turkey, and deer. However, planting oaks does not guarantee you will observe these species. But you will find that an increased variety of tree and shrub species will increase the types of food available at different times of the year, and the number of foraging and nesting niches. Improved forage and nesting niches increases wildlife use.

Each tree and shrub species is susceptible to specific diseases and pests and can endure varying degrees of environmental stress. By planting a diversity of trees and shrubs, one can minimize the probability that the entire wildlife planting would be destroyed as a result of prolonged drought, flooding, or disease and pest outbreaks.

Shrubs can be planted as part of a fencerow or travel lane; they can be combined with other conservation plantings, or they can be established along the edges of tree plantings. Many species of shrubs are of value to wildlife (Table 1). The fruit or nuts from shrubs such as dogwoods (*Cornus* spp.) and viburnums (*Viburnum* spp.) are an important food source. Soft (berries and fruit) and hard (nuts) mast produced by various tree species is a valuable

food source for wildlife (Table 2). Shrubs can be particularly important because several species of wildlife, especially songbirds, prefer to feed or nest on or near the ground. Shrubs also provide good protective cover for these types of wildlife. Pines and other softwoods provide limited food, but are an excellent source of winter and roosting cover, and they can provide important foraging substrate for insectivorous birds, especially migrating warblers. Tree plantings can benefit wildlife in many ways, particularly when combined with other conservation practices, or as a connection or corridor between patches of existing habitat.

The age of a tree planting is an important consideration for wildlife. Young tree plantings are of greatest value to early-successional wildlife that requires thick brushy cover. These include cottontail rabbit (*Sylvilagus floridanus*), woodcock (*Scolopax minor*), and numerous songbirds. Although trees typically do not produce a significant amount of mast until 20+ years of age, young tree plantings can serve as important resting and insect foraging areas for migrating songbirds.

Plantings for Wildlife

Location

Tree and shrub plantings can be useful in connecting patches of forested areas. Planting corridors of trees, shrubs, or both between woodlots can

provide travel lanes for terrestrial wildlife. Hard and soft mast-producing species can provide additional food benefits to a travel corridor. The width of the corridor should be as wide as possible; a minimum of 50 to 100 feet is best. Narrow corridors are still used by some wildlife, but these do not necessarily benefit them because predators and their prey both use these travel corridors. Predators moving through narrow corridors of habitat can efficiently find their prey that has taken up residence there. Wildlife corridors can be composed of one of the following:

- At least three rows of shrubs, one row of a soft mast tree species, and one row of a hard mast tree species. (Mast is the fruit or nuts produced by certain tree species.)
- When shrubs are a limiting habitat factor, create a shrubs-only corridor consisting of a minimum of five rows of shrubs. The tallest species should be located in center rows.
- When winter cover is a limiting habitat factor, create a corridor consisting of three rows of pine, one row of a hard mast tree species, and one row of shrubs.

See Table 1 for shrub species valuable to wildlife and Table 2 for tree species valuable to wildlife.

Shrub plantings on the edge of existing woodlots can improve habitat for edge species of wildlife. (Edge species are wildlife that thrives along areas where the edge of one habitat type meets the edge of one or more of another habitat type.) Plant one to four rows of shrubs along the boundary between a woodlot and a field.

Spacing

Plant spacing should depend on your goals and the surrounding habitat conditions. Some tree plantings for wildlife are established at 20 x 20 ft spacing. Wider spacing will delay crown closure and allow sunlight penetration for a longer period of time. The planting will have a diversity of annual and perennial forbs interspersed among the trees that will benefit some species of wildlife. A spacing of 9 x 9 ft or 10 x 8 ft is typical and is a good compromise between the needs of wildlife and timber production (Payne and Bryant 1994). If wide-spacing planting conflicts with other goals, establish the tree planting adjacent to early-successional habitats that provide similar structure such as weedy areas, old fields, or grass plantings. Skip rows throughout the planting to encourage herbaceous and shrub mixes within the tree planting (Payne and Bryant 1994).

A wider spacing does not benefit all species of wildlife. Decrease spacing in all areas of the planting to establish thick winter cover (or escape cover), if this type of cover is lacking elsewhere on the property. There are no definitive answers when it comes to spacing. Cost, existing and surrounding habitat, wildlife goals, and timber goals should all influence spacing decisions. Consult a professional forester, wildlife biologist, or county Extension educator for more information.

Maintenance

Herbicide treatment is required for optimal establishment and growth of tree plantings in most situations. Minimize or eliminate mowing around tree plantings. The timing of maintenance depends on the density and type of competing vegetation. Grasses, forbs, shrubs, and vines that grow in the planting will enhance its value for wildlife.

Many landowners are interested in obtaining timber from tree plantings. Often this requires grapevine control, but grapevines are a good soft mast source, nesting, and foraging habitat for wildlife. If grapevine control is necessary to meet timber goals, limit it to crop trees and leave vines on non-crop trees and along the edges of the tree planting.

If thinning of tree plantings is necessary for timber production, girdle the non-crop trees rather than remove them. Standing dead trees (snags) are beneficial to many species of wildlife such as woodpeckers, chickadees, and tree squirrels.

Size and Shape of Plantings

Many species of wildlife prefer habitat with a high amount of edge, that is, areas where two or more distinct habitat types meet. Edge habitats are valuable to wildlife because the plant community is often more diverse along edges, and more

than one habitat requirement for wildlife species is close together. Typically, trees and shrubs are planted in linear rows and square or rectangular blocks. This design does not maximize edge habitat. Irregular plantings that incorporate curves will be more valuable to wildlife. Abrupt edges are of lesser value to wildlife than edges with a transition zone or buffer.

Variety

Plant diversity is important for wildlife, both in structure and composition. Multi-layered vegetation will attract more wildlife species than monocultures. Tree plantings that incorporate shrub borders will provide additional food and cover values for wildlife. Various mast-producing

Table 1. *Selected shrub species valuable to wildlife*[1]

Common Name (Scientific Name)	Soil Drainage Class Suitability[2]	Ave. Mature Height (ft.)	Wildlife Information
American Plum (*Prunus americana*)	MWD - ED	30	Fruit eaten by songbirds. Recommended for quail and turkey.
Arrowwood (*Vibrunum dentatum*)	MWD - WD	9	Fruit eaten by songbirds.
Ash, Prickly (*Xanthoxylum americanum*)	SPD - WD	9	
Bayberry, Northern (*Myrica pensylvanica*)	MWD - ED	2 - 8	Fruit and seeds eaten by songbirds. Low, brushy stature provides concealment for ground-dwelling wildlife.
Blackhaw (*Viburnum prunifolium*)	MWD - WD	20	Fruit eaten by songbirds, quail, fox, and turkey.
Bladdernut (*Staphylea trifolia*)	SPD - WD	10	
Chokecherry (*Prunus virginiana*)	SPD - WD	18	Fruit eaten by songbirds.
Chokeberry, Black (*Aronia melanocarpa*)	SPD - WD	10	Fruit eaten by songbirds. Recommended for turkey.
Coralberry (*Symphoricarpos orbiculatus*)	MWD - WD	5	Fruit eaten by songbirds, quail, and ruffed grouse.
Crabapple, Flowering (*Malus* spp.)	SPD - WD	8 - 20	Fruit eaten by birds, deer, and small mammals.
Devils Walking Stick (*Aralia spinosa*)	SPD - MWD	20	Fruit eaten by birds.
Dogwood, Alternate Leaf (*Cornus alternifolia*)	SPD - WD	18	Fruit eaten by birds. Twigs browsed by deer and rabbits.
Dogwood, Flowering (*Cornus florida*)	MWD - WD	30	Recommended for quail and turkey.
Dogwood, Gray (*Cornus racemosa*)	SPD - WD	8	Fruit eaten by pheasant, turkey, and grouse.
Dogwood, Red Osier (*Cornus sericea*)	VPD - WD	10	Fruit eaten by songbirds, grouse, quail, and turkey. Twigs browsed by deer and rabbits.
Dogwood, Rough Leaved (*Cornus drummondii*)	PD - WD	18	Fruit eaten by songbirds, grouse, quail, turkey, and pheasant. Twigs browsed by rabbits and deer.
Dogwood, Silky (*Cornus amomum*)	VPD - WD	10	Sometimes browsed by rabbits and deer.
Eastern Wahoo (*Euonymus atropurpureus*)	SPD - WD	12	Fruit eaten by birds.
Elderberry (*Sambucus canadensis*)	VPD - WD	9	Fruit eaten by many birds including pheasant and dove. Recommended for quail and turkey.
Hazel Alder (*Alnus serrulata*)	VPD - WD	18	Deer browse on the twigs.

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Common Name (Scientific Name)	Soil Drainage Class Suitability[2]	Ave. Mature Height (ft.)	Wildlife Information
Hazelnut (*Corylus americana*)	MWD - WD	15	Small nut eaten by squirrel, deer, jays, grouse, and pheasant. Recommended for quail and turkey.
Highbush Cranberry (*Viburnum trilobum*)	VPD - WD	9	Fruit eaten by grouse, pheasant, and songbirds. Recommended for turkey.
Indigobush (*Amorpha fruticosa*)	VPD - WD	6	
Leadplant (*Amorpha canescens*)	WD - ED	3	
Nannyberry (*Viburnum lentago*)	SPD - WD	18	Fruit eaten by songbirds. Recommended for turkey.
New Jersey Tea (*Ceanothus americanus*)	WD - ED	3	Quail and wild turkey eat the three-celled capsule.
Ninebark (*Physocarpus opulifolius*)	VPD - WD	10	Fruit are small dry bladders. Recommended for turkey.
Pawpaw (*Asimina triloba*)	SPD - WD	20	Fruit eaten by opossum, squirrels, raccoon, and fox.
Prairie Crab (*Malus ioensis*)	PD - WD	30	Fruit eaten by opossum, squirrel, raccoon, and fox. Recommended for turkey.
Redbud (*Cercis canadensis*)	MWD - WD	30	Seeds eaten by a few songbirds.
Shrubby St. Johnswort (*Hypericum prolificum*)	SPD - WD	6	
Spicebush (*Lindera benzoin*)	VPD - WD	9	Twigs and fruit eaten by songbirds, grouse, rabbit, opossum, quail, and deer. Recommended for turkey.
Spirea (*Spiraea alba*) (*Spirea tomentosa*)	VPD - WD	4	Buds eaten by ruffed grouse. Twigs browsed by deer and rabbits.
Sumac, Shining (*Rhus copallina*)	MWD - ED	8	Fruit eaten by songbirds, quail, dove, and pheasant. Recommended for turkey.
Sumac, Smooth (*Rhus glabra*)	MWD - ED	12	Twigs and fruit eaten by songbirds, pheasant, and dove. Recommended for quail and turkey.
Sumac, Staghorn (*Rhus typhina*)	MWD - ED	15	Fruit eaten by songbirds, quail, dove, and pheasant. Twigs browsed by rabbits and deer. Good for turkey.
Wild Blackberry (*Rubus allegheniensis*)	MWD - ED	5	Provides cover and food for birds and mammals. Recommended for quail and turkey.
Wild Black Raspberry (*Rubus occidentalis*)	MWD - WD	5	
Wild Sweet Crabapple (*Malus coronaria*)	SPD - ED	30	Recommended for quail and turkey.
Willow, Prairie (*Salix humilis*)	PD - SPD	13	Use where prairie requires woody vegetation for the targeted species, such as perches for dickcissels.
Winterberry (*Ilex verticillata*)	VPD - WD	15	Buds and twigs browsed by deer and rabbits.
Witch-hazel (*Hamamelis virginiana*)	SPD - WD	18	Seeds, buds, and twigs eaten by deer, rabbit, quail, and pheasant.

[1] Adapted from USDA-NRCS Conservation Practice Standard 645, Upland Wildlife Habitat Management, Indiana NRCS Field Office Technical Guide.

[2] Key for soil drainage class suitability: ED = excessively drained; WD = well drained; MWD = moderately well drained; SPD = somewhat poorly drained; PD = poorly drained; and VPD = very poorly drained.

Table 2. *Selected tree species valuable to wildlife*[1]

Common Name (Scientific Name)	Soil Drainage Class Suitability[2]	Ave. Mature Height (ft.)	Wildlife Information
Pine/Softwoods			
Baldcypress *(Taxodium distichum)*	VPD - WD	80	Waterfowl occasionally consume seeds. Trees also serve as perching areas for song and wading birds.
Cedar, Eastern Red *(Juniperus virginiana)*	SPD - ED	45	Berries consumed by songbirds. Recommended for turkey.
Cedar, Northern White *(Thuja occidentalis)*	PD - WD	40	Foliage often browsed by deer in late winter as an emergency food source. Recommended for turkey.
Hemlock, Eastern *(Tsuga canadensis)*	SPD - WD	70	The dense low foliage of young plants makes good winter cover for grouse, turkey, deer, and other wildlife. Excellent nesting habitat. Small winged seeds fed on by chickadees, pine siskins, crossbills, and red squirrels; twigs browsed by deer and rabbits.
Pine, Eastern White *(Pinus strobus)*	MWD - WD	90	Pines make excellent roosting trees for many species of birds. Seeds are eaten by a wide variety of birds, squirrels, and mice. Recommended for turkey.
Pine, Jack *(Pinus banksiana)*	WD - ED	40	Pines make excellent roosting trees for many species of birds. Seeds are eaten by a wide variety of birds, squirrels, and mice. Recommended for turkey.
Pine, Virginia *(Pinus virginiana)*	MWD - ED	40	
Non-Mast Producing Species			
Aspen, Bigtooth *(Populus grandidentata)*	MWD - WD	70	Twigs and bark consumed by deer and beavers. Buds and catkins eaten by ruffed grouse.
Cottonwood, Eastern *(Populus deltoides)*	PD - ED	90	Recommended for turkey.
Sycamore, American *(Platanus occidentalis)*	PD - WD	90	Sycamore has low food value to wildlife; however, this species forms an important structural component of bottomlands and floodplains.
Soft Mast Producing Species			
Ash, Green *(Fraxinus pennsylvanica)*	VPD - WD	60	Seeds eaten by squirrels, quail, and songbirds.
Ash, White *(Fraxinus americana)*	MWD - WD	70	Seeds eaten by squirrels, quail, and songbirds. Recommended for turkey.
Birch, River *(Betula nigra)*	VPD - WD	50	Stands of birch serve as important cover for riparian dwelling animals.
Cherry, Black *(Prunus serotina)*	MWD - WD	70	Familiar fruits eaten by many species of songbirds, ruffed grouse, and pheasant. Recommended for turkey.
Gum, Black *(Nyssa sylvatica)*	PD - WD	60	Fruits consumed by songbirds and pileated woodpeckers. Recommended for turkey.
Hackberry *(Celtis occidentalis)*	SPD - WD	50	Fruits sparingly eaten by songbirds, including cedar waxwings and robins during winter. Recommended for turkey.
Hawthorn, Cockspur *(Crataegus crusgalli)*	ED - SPD	30	Fruits are important winter food source for many songbirds including ruffed grouse. Fruit eaten by deer, fox, rabbit, pheasant, and turkey. Excellent nesting habitat for songbirds.
Hawthorn, Green *(Crataegus viridis)*	ED - SPD	30	
Hawthorn, Washington *(Crataegus phaenopyrum)*	ED - SPD	30	
Kentucky Coffeetree *(Gymnocladus dioicus)*	SPD - WD	50	Fruits relished by squirrels, opossum, raccoon, and songbirds.

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Common Name (Scientific Name)	Soil Drainage Class Suitability[2]	Ave. Mature Height (ft.)	Wildlife Information
Maple, Black *(Acer nigrum)*	MWD - WD	70	Samaras are widely consumed by birds and squirrels. Browsed by deer. Recommended for turkey.
Maple, Red *(Acer rubrum)*	VPD - WD	70	
Maple, Silver *(Acer saccharinum)*	VPD - WD	80	
Maple, Sugar *(Acer saccharum)*	MWD - WD	70	
Persimmon *(Diospyros virginiana)*	MWD - WD	50	Raccoons as well as some songbirds readily consume large berries.
Sassafras *(Sassafras albidum)*	ED - SPD	40	Browsed by deer, rabbits, beaver, fox squirrel, and woodchuck. Fruit eaten by raccoons, squirrels, woodchucks, and many songbirds. Recommended for quail.
Serviceberry *(Amelanchier arborea)*	MWD - WD	30	Purplish fruits rapidly consumed by birds. Recommended for turkey.
Sweetgum *(Liquidambar styraciflua)*	PD - WD	85	Seeds consumed by finches in winter.
Tuliptree *(Liriodendron tulipifera)*	MWD - WD	90	Seeds eaten by songbirds, squirrels, quail, and turkey.
Hard Mast Producing Species			
Beech, American *(Fagus grandifolia)*	MWD - WD	75	Nuts consumed by deer and squirrels. Recommended for turkey.
Buckeye, Ohio *(Aesculus glabra)*	SPD - WD	60	Nuts sparingly consumed by eastern fox squirrels.
Butternut *(Juglans cinerea)*	MWD - WD	50	Elliptical nuts consumed by squirrels.
Hickory, Bitternut *(Carya cordiformis)*	SPD - WD	50	The nuts of these species constitute an important food source for squirrels and wood ducks. Recommended for turkey.
Hickory, Mockernut *(Carya tomentosa)*	ED - MWD	50	The nuts of these species constitute an important food source for squirrels and wood ducks Recommended for turkey.
Hickory, Pignut *(Carya glabra)*	WD - ED	50	
Hickory, Shagbark *(Carya ovata)*	MWD - WD	70	The loose shaggy bark makes excellent bat roosting sites. Recommended for turkey.
Oak, Black *(Quercus velutina)*	MWD - ED	60	Acorns from oaks are perhaps the most important food source for a variety of wildlife including woodpeckers, squirrels, and deer. Recommended for turkey.
Oak, Bur *(Quercus macrocarpa)*	PD - ED	80	
Oak, Cherrybark *(Quercus pagoda)*	SPD - WD	75	
Oak, Chinquapin *(Quercus muhlenbergii)*	MWD - ED	60	
Oak, Pin *(Quercus palustris)*	VPD - WD	75	The smaller pin oak acorns are particularly favored by wood ducks.
Oak, Red *(Quercus rubra)*	MWD - WD	80	

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Common Name (Scientific Name)	Soil Drainage Class Suitability[2]	Ave. Mature Height (ft.)	Wildlife Information
Oak, Scarlet *(Quercus coccinea)*	MWD - ED	70	Acorns from oaks are perhaps the most important food source for a variety of wildlife including woodpeckers, squirrels, and deer. Recommended for turkey.
Oak, Shingle *(Quercus imbricaria)*	SPD - WD	50	
Oak, Shumard *(Quercus shumardii)*	SPD - WD	75	
Oak, Swamp Chestnut *(Quercus michauxii)*	SPD - WD	70	
Oak, Swamp White *(Quercus bicolor)*	VPD - WD	70	
Oak, White *(Quercus alba)*	MWD - WD	90	
Pecan *(Carya illinoensis)*	SPD - WD	120	Ellipsoid nuts readily consumed by a variety of wildlife.
Walnut, Black *(Juglans nigra)*	MWD - WD	80	Nuts consumed by squirrels.

[1] Adapted from USDA-NRCS Conservation Practice Standard 645, Upland Wildlife Habitat Management, Indiana NRCS Field Office Technical Guide.

[2] Key for soil drainage class suitability: ED = excessively drained; WD = well drained; MWD = moderately well drained; SPD = somewhat poorly drained; PD = poorly drained; and VPD = very poorly drained.

species produce food at different times throughout the growing season. Planting adjacent blocks in different years will provide added structural diversity.

Summary

Tree and shrub plantings can be beneficial to wildlife. The amount of value depends on a variety of factors and includes not only the specific characteristics of the planting, but the type and quality of surrounding habitat and the habitat requirements of wildlife species. Following the guidelines presented in this paper will enhance plantings for wildlife. However, every situation is unique. Thus, there is no substitute for consulting with a professional wildlife biologist (www.in.gov/dnr/fishwild/huntguide1/wbiolo.htm).

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