



Forest Habitat Improvement



Forests provide habitat needs for more than half of Indiana's wildlife species. The extent to which wildlife occur and thrive in our forests is dependant on many factors including the amount of forest cover, diversity of forest types (oak-hickory, beech-maple, pine), diversity of developmental stages (age/size classes), and their arrangement. Forest wildlife habitat improvement can be facilitated by using sound timber management practices to provide a diversity of habitats over the entire landscape. It may be as simple as excluding livestock from the forest to intensive management involving frequent cuttings.

Forests typically contain one or more forest type and developmental stage, due to a combination of the physical characteristics of the site (slope, soil type, aspect) and past events (timber harvesting, grazing, fire, tornado damage, etc.). Identifying the forest types and developmental stages of a forest habitat is the first step in the design of a management plan. Developmental stages of the forest can be estimated by the size of trees in the stand. A seedling/sapling stand is a young stand (0-20 years) with trees that range from a few inches to 20 feet tall, and are less than five inches in diameter at breast height. A pole size stand (20-50 years) has trees that are 5-11 inches in diameter at breast height. Sawtimber stands (>50 years) have trees that are at least 12 inches in diameter. Old growth forests are loosely defined as mature forests over 100 yrs old with a relatively open understory.

The age of a forest stand influences which wildlife species will use the area. It is important to remember that different wildlife species prefer different ages of forest stands. For example, early seedling/ sapling stages would be used by ruffed grouse, woodcock and yellow-breasted chat. As the stand matures to sawtimber, a different variety of wildlife including tree squirrels, wild turkey, scarlet tanagers and pileated woodpeckers will replace the previous community. It is important to set management goals that impact the wildlife community in a positive manner.

Once the forest types and ages have been determined, it is time to create a management plan. In developing a plan you should identify problem areas such as lack of

mast trees, cavity trees, and the possible impacts of adjoining land ownerships. Due to the relatively small size of most privately owned Indiana forests, management plans should also consider what requirements are being provided by adjoining areas.

Livestock Exclusion

Proper fencing to exclude livestock is an important part of maintaining or improving a quality woodland for both wildlife and timber. Cattle, horses and other livestock graze forest understory plants, damage trees, and compact the soil. The effects of these shorten the life span of trees, decrease food and cover available for wildlife, cause erosion, and reduce the timber value of most trees. Compared to good pasture, livestock gain little from grazing forests. Losses of wildlife habitat and timber values far exceed any benefits from grazing. Simply fencing cattle out of the forest areas can greatly improve habitat for wildlife. Shade can be provided by allowing livestock to use a small area of the forest, instead of the entire area.



Woodland grazing destroys wildlife habitat, decreases food and cover, and compacts the soil.

Mast Trees

Mast trees are trees that produce a fruit or nut. Soft mast refers to fruit such as persimmons, elderberries, cherries, dogwoods and sassafras. Hard mast refers to nuts such as acorns, hickory nuts, walnuts, and beechnuts. Both hard and soft mast trees are important in providing food for wildlife. It is important to encourage a variety of mast producing species, both hard and soft, throughout the forest stand. Different tree species flower at different times of the spring and also have varying seed production. By maintaining a variety of mast producing trees, you can help avoid a complete mast failure due to environmental factors such as a late frost or drought. A good rule of thumb is to maintain a variety of at least 6-8 mast producing trees per acre.

Thinnings through *Timber Stand Improvement* or a selective harvest, can improve mast production. By removing tree top, or crown competition, and allowing selected crop trees to receive more sunlight, more mast is usually produced. Thinnings will also expose vegetation in the forest understory to sunlight and promote development of a denser understory, improving nesting, brooding, and escape cover for several wildlife species. Thinnings, timed at 10 to 20 year intervals in oak-hickory forests, can increase hard mast production as much as seven times over non-thinned stands. Improvements to soft mast production can be made through *Woodland Edge Enhancement*.

Wildlife Openings

Wildlife openings are an important management component that diversify plant communities by encouraging herbaceous and shrubby growth. This growth in turn provides critical habitat for early successional forest wildlife species. Openings can be classified as temporary or permanent. Temporary openings are usually the result of timber harvest when the mature trees are removed and the area is allowed to go through succession back to a mature forest. Permanent openings are areas that are maintained in a herbaceous cover. Areas such as log landings and trails make for good permanent opening sites. For additional information see the *Forest Openings* fact sheet.



Den and cavity trees provide nesting, roosting, and escape sites for many forms of wildlife.

Den and Cavity Trees

Approximately 25% of our forest wildlife species depend on tree cavities for nesting, denning, roosting, or escape sites. Most cavities are created by woodpeckers or by natural tree decay due to age, weather, disease and injury. While some cavity users are generalist, most wildlife species select cavities based on cavity size, location, and whether the cavity occurs in a living or dead tree. As a result, a variety of cavities need to be maintained in both living and dead trees of various diameters throughout the forest .

When conducting timber harvests or timber stand improvement, living cavity trees should be retained whenever possible. Living cavity trees are important because they have the potential to provide a continuing source of cavity sites throughout the remainder of their life and even after they die. Dead trees, on the other hand, quickly deteriorate. When selecting trees to retain as cavity trees, select trees that have long life spans, and attain large diameters, such as white oaks.

Choose trees with healthy crowns that are likely to remain in the stand for a long period of time. Cavities should be present in trees with diameters from 4 to 20 inches at breast height. A good guide would be to maintain 8 to 10 cavity trees per acre. Productive mast trees can also perform double duty in providing cavities. In stands where cavities are lacking, retain large trees that have the potential to produce cavities. Trees with storm damage, timber harvest damage, cankers (diseased areas), or possessing woodpecker holes have potential as future cavity trees. **Artificial Nesting Cavities** can also be erected until natural cavities have time to form.

Although dead, standing trees (snags) will quickly deteriorate, they can provide many benefits, including nesting and denning cavities, insect foraging sites, and perches for raptors. In most situations, snags will naturally occur within the forest and are not necessary to create. However, if trees are to be removed as part of a timber stand improvement practice, it is usually best to retain some of these trees as snags. Snags can be created by girdling trees that are 6 inches or larger in diameter at breast height. The easiest way to girdle a tree is to make two chainsaw cuts completely around the tree. Cuts should be about 2 inches deep and 3-4 inches apart. Avoid deep girdling to allow the snag to stand longer. Maintaining dead snags has no affect on the growth of adjacent future timber trees. Six to eight snags with a variety of tree diameters should be maintained per acre. Once a snag has fallen, it will continue to provide wildlife habitat for reptiles, amphibians and small mammals. As the fallen tree decays it returns nutrients to the soil.

Special consideration should be given as to whether cull trees should remain standing in temporary openings as a result of a timber harvest. If one of the forest management goals is to encourage nesting habitat for early successional migratory songbirds, then cull trees should probably be cut and removed as part of the timber harvest. Research has shown that crows and cowbirds effectively utilize snags, left in the middle of temporary openings, as perches which increases their success in locating eggs and nests of other birds nesting within the new growth. Crows commonly eat the eggs of other birds, while cowbirds lay their eggs in nests of other birds. This nesting strategy, referred to as brood parasitism, often results in the host successfully rearing cowbirds at the expense of raising their own young. If, on the other hand, a management goal is to increase potential roosting habitat for bats, then girdling cull trees to create snags within the opening could be beneficial. As the trees decay, slabs of bark pull away from the tree, creating small crevices that bats utilize as roosting shelter during most of the daylight hours. Some bats, including the Indiana bat (*Myotis sodalis*) also utilize these roosts for raising young. Research has shown that roosting sites in openings, receiving significantly more sunlight than shaded sites, tend to be more attractive and productive.

Grapevine Management

Grape vines are an important component in forest wildlife management. While many forest managers view grape vines as a problem, a few vines in your woodland will provide numerous benefits. Grapes provide an important food source for many wildlife species including songbirds, game birds, mammals and some reptiles. They also provide nest attachment sites for songbirds and squirrels, and strands of grape vine bark are utilized by many forest dwelling songbirds to fashion and line their nests. Leaving three to four crown-attached grapevines per acre is sufficient. Good areas to leave grape vines include woodland edges, den trees, snags, and in poor quality trees. Leaving vines in these areas will not hinder the growth of preferred timber-producing trees.

Riparian Zones

Special attention should be paid to forest management along stream areas. Not only are these riparian zones part of the forest, they also stabilize streambanks, filter sediments, and act as travel corridors for wildlife movement from one suitable forest cover to another. While the optimum width for stream side zones is difficult to determine, a good recommendation would be 150 to 200 foot width along the stream. While narrow strips of 50 feet or less provide some benefit, the size is usually insufficient for most wildlife species. Zones need to at least be wide enough to provide proper shade for the stream. Detailed management recommendations for streamside zones can be found in the *Riparian Zones* Fact Sheet.

Summary

Past land use changes have left Indiana with smaller and more fragmented forests. Manipulation of vegetative cover on a smaller scale and a more regular basis, permits the landowner to enjoy a diversity of wildlife for aesthetic and recreational benefit. Proper forest management makes it possible to benefit a wide variety of species from worm eating warblers to pileated woodpeckers, to wild turkeys. Wildlife habitats can be enhanced so wildlife species thrive in our forests while still producing quality hardwoods, firewood, and recreational opportunities.

Related Habitat Management Fact Sheets:

Woodland Edge Enhancement
Forest Openings
Forest Regeneration
Riparian Zones
Timber Stand Improvement

Water Hole Development
Nesting Structures for Squirrels
Artificial Nesting Cavities
Brush Pile Construction

Hard Mast Producing Trees

Common Name	Scientific Name	Average Mature Height (ft.)	Mast Consumed by:
Beech, American	<i>Fagus grandifolia</i>	75	Deer, squirrels, chipmunks, turkey, ruffed grouse, pheasant, songbirds, woodpeckers
Buckeye, Ohio	<i>Aesculus glabra</i>	60	Squirrels (sparingly)
Butternut	<i>Juglans cinerea</i>	50	Squirrels
Hickory, Bitternut	<i>Carya cordiformis</i>	50	An important food source for squirrels and chipmunks. Nut fragments are also eaten by deer, quail, turkey, pheasant, woodpeckers and some songbirds.
Hickory, Mockernut	<i>Carya tomentosa</i>	50	
Hickory, Pignut	<i>Carya glabra</i>	50	
Hickory, Shagbark	<i>Carya ovata</i>	70	
Hickory, Shellbark	<i>Carya laciniosa</i>	70	
Oak, Black	<i>Quercus velutina</i>	60	Acorns are perhaps the most important food source for a variety of wildlife, including ducks, songbirds, woodpeckers, ruffed grouse, turkey, quail, pheasant, deer, rabbits, squirrels, chipmunks, mice.
Oak, Bur	<i>Quercus macrocarpa</i>	80	
Oak, Cherrybark	<i>Quercus pagoda</i>	75	
Oak, Chestnut	<i>Quercus prinus</i>	75	
Oak, Chinquapin	<i>Quercus muhlenbergii</i>	60	
Oak, Pin	<i>Quercus palustris</i>	75	
Oak, Red	<i>Quercus rubra</i>	80	
Oak, Scarlet	<i>Quercus coccinea</i>	70	
Oak, Shingle	<i>Quercus imbricaria</i>	50	
Oak, Shumard	<i>Quercus shumardii</i>	75	
Oak, Swamp Chestnut	<i>Quercus michauxii</i>	70	
Oak, Swamp White	<i>Quercus bicolor</i>	70	
Oak, White	<i>Quercus alba</i>	90	
Pecan	<i>Carya illinoensis</i>	120	Variety of wildlife
Walnut, Black	<i>Carya nigra</i>	80	Squirrels

Soft Mast Producing Trees

Common Name	Scientific Name	Average Mature Height (ft.)	Mast Consumed by:
Ash, Green	<i>Fraxinus pennsylvanica</i>	60	Quail, turkey, waterfowl, squirrels, songbirds
Ash, White	<i>Fraxinus americana</i>	70	
Birch, River	<i>Betula nigra</i>	50	Grouse, songbirds
Cherry, Black	<i>Prunus serotina</i>	70	Grouse, pheasant, quail, turkey, squirrels, songbirds
Elm, American	<i>Ulmus americana</i>	90	Waterfowl, pheasant, turkey, squirrels, songbirds
Elm, Red	<i>Ulmus rubra</i>	70	
Gum, Black	<i>Nyssa sylvatica</i>	60	Waterfowl, grouse, quail, turkey, squirrels, songbirds
Hackberry	<i>Celtis occidentalis</i>	50	Quail, turkey, fox squirrel, songbirds
Hawthorn, Cockspur	<i>Crataegus crus-galli</i>	30	Grouse, pheasant, turkey, deer, squirrels, songbirds
Hawthorn, Green	<i>Crataegus viridis</i>	30	
Hawthorn, Washington	<i>Crataegus phaenopyrum</i>	30	
Kentucky Coffeetree	<i>Gymnocladus dioica</i>	50	Squirrels, raccoon, songbirds
Maple, Black	<i>Acer nigrum</i>	70	Grouse, quail, turkey, squirrels, songbirds
Maple, Red	<i>Acer rubrum</i>	70	
Maple, Silver	<i>Acer saccharinum</i>	80	
Maple, Sugar	<i>Acer saccharum</i>	70	
Persimmon	<i>Diospyros virginiana</i>	50	Deer, turkey, raccoon, songbirds
Sassafras	<i>Sassafras albidum</i>	40	Quail, turkey, squirrels, songbirds
Serviceberry	<i>Amelanchier arborea</i>	30	Grouse, pheasant, squirrels, songbirds
Sweetgum	<i>Liquidambar styraciflua</i>	85	Waterfowl, quail, songbirds
Tuliptree	<i>Liriodendron tulipifera</i>	90	Seeds eaten by squirrels and songbirds

Prepared by the Indiana Department of Natural Resources, Division of Fish and Wildlife. For up-to-date information concerning the Indiana Division of Fish and Wildlife, or for information on the location of your District Wildlife Biologist, visit our website at www.wildlife.IN.gov