



The Role of Forest Openings

Indiana State Forests have been shaped by various natural and human-caused disturbances. Openings in the forest canopy occur both naturally and as the result of human activities. Natural events include fire, storms, insects, floods and drought. Native Americans used fire and other methods to create openings to attract wildlife and grow crops. Settlers cut trees to establish homesteads and then worked the land for crops and timber.

Indiana's forests have changed greatly since the early 1800s. Most of the vast forests of the northern part of the state have been lost to agriculture and development. However, southern Indiana again contains a large proportion of forestland. The Division of Forestry actively manages 158,000 acres of forestland in Indiana under the multiple-use philosophy for traditional forest values, including timber production, wildlife habitat, watershed protection, recreation and demonstration areas.

A closed-canopy forest generally does not have a diversity of understory vegetation. The canopy prevents sunlight from reaching the forest floor. Tree regeneration is limited to a shade-tolerant species. When openings are created, either naturally or through forest management, sunlight enables the growth of a wide variety of vegetation not found under a full canopy.



Pines planted on eroding hillside

Pine Conversion Openings

Prior to State Forest ownership, abandoned crop lands and cut-over timber lands left large areas with bare, depleted, eroding soils. These soils were so poor that the native hardwoods would no longer grow. Pines and other conifers were able to grow in these poor soils and were planted throughout southern Indiana. Pines are not native to most of the State Forests. In these areas, the pines have done their job in stabilizing and re-establishing the soils and are being removed to allow native hardwoods to reoccupy these sites. Natural processes are at work to convert this "artificial" forest back to site-appropriate hardwood species. A harvest of these pines is an effective way to help re-establish young hardwoods while also using renewable wood resources. Removal of the pines provides light and space for a new generation of tulip poplar, oak, hickory and other hardwoods. Replanting trees is not necessary in the Central Hardwoods region after a harvest — abundant seed sources result in natural regeneration. Within a few years, these areas will be occupied by a mixture of shrubs, grasses, broadleaf plants and tree seedlings that contribute to forest diversity and provide valuable wildlife habitat.

Conversion is defined as the silvicultural process of changing the tree species composition of a tract of forestland from one that is dominated by non-native conifers to one comprising only native trees. The goals are to structurally diversify the forest to have young forest within a mature hardwood forest and restore the site to native hardwood species.

Group Selection Openings

Most tracts of native hardwoods on Indiana State Forests are harvested using the single-tree selection system. Professional foresters inventory the tracts, determine a prescription for future management based on objectives for the tract including species present, tree conditions, wildlife habitat needs, and insect or disease presence. After taking all factors into consideration, foresters determine whether a harvest is appropriate. If so, the forester determines which trees should be removed and marks them.

In some cases, a small opening should be created to allow more sunlight to the forest floor than is allowed by single-tree removal. These openings mimic small-scale natural disturbance, thus simulating the natural regeneration of shade-intolerant tree species that need more sunlight to germinate and grow. Typically, group openings on State Forests average less than 3 acres.

Benefits of Forest Openings

Creating openings in the forest canopy can have many benefits. One of the greatest benefits is the increase in species abundance and diversity among both plants and animals. Increased light on the forest floor promotes the growth of shrubs and herbaceous plants, creating more diversity in the forest structure or spatial arrangement of plants. Tree regeneration following these harvests is dominated by shade-intolerant and intermediate tolerant tree species such as tulip tree, black cherry, red oak and walnut.

Many wildlife species in Indiana depend on these early successional areas for food, shelter and space. Within 10 years, literally thousands of seedlings occupy the area and a new forest is forming. These young forest areas, which are significantly decreasing across the state, are crucial to certain species of wildlife. Several endangered species and species of special concern in Indiana depend on early successional habitat.

Although many migratory songbirds are considered habitat generalists, studies have shown that they have specific early successional habitat requirements during the breeding and post-fledgling seasons.



Photo by Patrick Ruhl,
Purdue Forestry & Natural Resources

Ruffed grouse, now a species of special concern in Indiana, require areas of young forest as well as areas with downed woody debris.



Photo by Donna Rogler, Indiana DNR

The Eastern box turtle is another species of concern in Indiana. These land dwelling turtles need access to water, forests and open areas. Nesting females need open areas that receive direct sunlight.



Photo by Phil Jones, Indiana DNR

Timber rattlesnakes use small openings and sunny canopy gaps to search for prey and for life processes such as gestation and skin shedding.

While the immediate result of any forest canopy disturbance—natural or human-caused, may not be aesthetically pleasing, it only takes a year or two for new plants to colonize the area, creating new habitat and opportunities for diversification. Cutting small groups of trees open up views of the sky and can create vistas across the landscape. Group-selection openings can diversify a landscape by creating a mosaic of forest stages, adding interest to a solid forested landscape.

The photos below are from the Hardwood Ecosystem Experiment (HEE) and show the progression over time of an opening from pre-harvest to 6.5 years after harvest. Within a few years, the harvested area is occupied by new forest growth. The HEE is a long-term, landscape-level field experiment to study forest management and its impacts, and is being conducted on Indiana State Forest lands. More information is at heeforeststudy.org.



Spring 2008 Preharvest



Fall 2008, Immediate Post-harvest



Spring 2011, 2.5 Years Post-harvest



Spring 2015, 6.5 Years Post-harvest

Photos by John Maxwell, Indiana DNR