

# Forest Succession and Wildlife

If undisturbed, an open field over time will be invaded by shrubs, which in turn will be replaced by saplings, young trees, and eventually a mature forest. Foresters often refer to these phases as the grass and forbs stage, shrub and sapling stage, pole stage, and mature forest. In general, plant communities progress in an orderly and predictable manner known as forest succession. However, the rate of forest succession on any one property is difficult to predict and may vary with soil conditions, topography, frequency of natural disturbance, number of deer, and amount of competing vegetation. The abundance and kinds of wildlife also change as a forest matures, because the quantity and quality of food, water, cover, and space are changing. Young forests, for example, often have an abundance of berry-producing shrubs and brushy cover, but few hard mast (acorns, hickory nuts) or cavity trees. As a result, species that feed on acorns (e.g. squirrels) or nest in large decaying trees (e.g., pileated woodpeckers) are much more abundant in older forests. The white-tailed deer, use several stages of plant succession. Deer need the cover provided by thickets of shrubs and saplings, but they also feed extensively on acorns found under trees in a mature forest and seek out succulent green vegetation and grains in agricultural fields. Providing the correct stage or stages of plant succession in the right amount and distribution is the key to attracting wildlife to your property. Whether you wish to manage your land for a variety of wildlife species or for a single species, you will need to know what stage(s) of forest succession each species depends on for food and cover. The table on page 9 lists various wildlife species and the stage(s) of succession each species requires to live. Additional information on stages of forest succession and their value to wildlife is provided in *Pennsylvania Woodlands 6: Woodland Wildlife Management*.

## VERTICAL AND STRUCTURAL DIVERSITY

As a forest changes through succession, its structure also changes. Vertical structure is important because in a forest with a well-developed overstory, understory, shrub, and herbaceous strata, a diverse array of plants and animals can coexist. Maintaining vertical structure guarantees that a large variety of wildlife will be present. Many wildlife species, particularly birds, divide the habitat vertically. For example, ovenbirds, scarlet tanagers, and chickadees are all found in mature forests, but ovenbirds feed mostly on the ground, tanagers prefer the canopy top, and chickadees like intermediate heights. More species are able to coexist in a forest with multiple layers than in a forest where all the trees are the same height. Vertical diversity is greatest in forests with a large variety of trees of different ages. Within similar forests, vertical diversity is greater in areas with few deer. Large deer populations often browse and remove the lower stratum of vegetation. Structural diversity refers to the variety, size, and shape of both living and nonliving organisms. Large standing and fallen dead trees, plant species diversity, and vertical diversity all contribute to structural diversity in the forest. Many elements of structural diversity, such as rotting logs and snags, provide hiding places for wildlife and attract insects and fungi which serve as food for wildlife. These elements make a very large contribution to the species richness and ecology of an area.

**PREFERRED FOREST SUCCESSIONAL STAGES USED BY SELECTED WILDLIFE SPECIES**

| SPECIES                 | GRASS AND FORBS | SHRUBS AND SAPLINGS | POLE STAGE | MATURE FOREST |
|-------------------------|-----------------|---------------------|------------|---------------|
| <b>Amphibians</b>       |                 |                     |            |               |
| American toad           | ■               | ■                   | ■          | ■             |
| Gray tree frog          |                 | ■                   | ■          | ■             |
| Red-back salamander     |                 |                     | ■          | ■             |
| Slimy salamander        |                 |                     | ■          | ■             |
| Red-spotted newt        |                 |                     | ■          | ■             |
| Wood frog               |                 | ■                   | ■          | ■             |
| <b>Reptiles</b>         |                 |                     |            |               |
| Eastern box turtle      | ■               | ■                   | ■          | ■             |
| Eastern garter snake    | ■               | ■                   | ■          | ■             |
| Northern redbelly snake |                 |                     | ■          | ■             |
| Smooth green snake      | ■               | ■                   |            |               |
| Wood turtle             | ■               | ■                   | ■          | ■             |
| Black rat snake         | ■               | ■                   | ■          | ■             |
| <b>Birds</b>            |                 |                     |            |               |
| American woodcock       | ■               | ■                   |            |               |
| Black-capped chickadee  |                 | ■                   | ■          | ■             |
| Chipping sparrow        | ■               | ■                   |            |               |
| Eastern meadowlark      | ■               |                     |            |               |
| Grasshopper sparrow     | ■               |                     |            |               |
| Great-horned owl        | ■               |                     |            | ■             |
| Ovenbird                |                 |                     |            | ■             |
| Pileated woodpecker     |                 |                     |            | ■             |
| Red-eyed vireo          |                 |                     | ■          | ■             |
| Red-tailed hawk         | ■               |                     |            | ■             |
| Ruffed grouse           | ■               | ■                   |            | ■             |
| Rufous-sided towhee     |                 | ■                   |            |               |
| Song sparrow            |                 | ■                   |            |               |
| Wild turkey             | ■               |                     |            | ■             |
| <b>Mammals</b>          |                 |                     |            |               |
| Black bear              |                 |                     |            | ■             |
| Cottontail rabbit       | ■               | ■                   |            |               |
| Gray squirrel           |                 |                     |            | ■             |
| Meadow vole             | ■               |                     |            |               |
| Red fox                 | ■               |                     |            | ■             |
| White-tailed deer       | ■               | ■                   |            | ■             |

## Old Field Succession



|   |  |  |  |   |  |   |
|---|--|--|--|---|--|---|
| <p><b>1<sup>st</sup> year</b><br/>Low-growing annual grasses and forbs (ragweed, horseweed &amp; crabgrass, many non-native weeds).</p>   | <p><b>2<sup>nd</sup> to 5<sup>th</sup> year</b><br/>Perennial grasses and forbs (asters, goldenrods, Queen Anne's lace, knapweed and many others).</p> | <p><b>3<sup>rd</sup> to 10<sup>th</sup> year</b><br/>Woody shrubs and shade intolerant tree seedlings invade among perennial herbs and grasses (blackberries &amp; other <i>Rubus</i> species, sumacs, greenbrier)</p> | <p><b>10<sup>th</sup> to 20<sup>th</sup> year</b><br/>Pioneer tree saplings form thickets (Red cedar, pines, locust, aspen or cherries depending on site).</p> | <p><b>20<sup>th</sup> to 70<sup>th</sup> year</b><br/>Short-lived pioneer species gradually replaced by taller and longer lived trees (Tulip tree, ash, Red maple, Black birch, Black gum).</p> | <p><b>70<sup>th</sup> to 100<sup>+</sup> yrs.</b><br/>Canopy dominated by long-lived hardwoods (mixed oaks, hickories, maples). Understory of shade tolerant species</p> | <p><b>Until the next disturbance</b><br/>Shade tolerant species dominate the canopy and understory (hemlock, sugar maple, beech).</p> |
| <p><b>Pioneer Shade-intolerant Species</b><br/>Which species of herbs, shrubs and trees dominate depends on location, site history, soil moisture, topography and circumstance.</p> |  |  |  | <p><b>Moderately Shade-tolerant Species</b><br/>Canopy trees are all about the same age (<math>\pm</math> 20 yrs).</p>  | <p><b>Shade Tolerant Species</b><br/>Gaps from dying trees lead to an uneven age canopy.</p>   |   |