

## Forest Types of Michigan

# Jack Pine

MSU Forestry Extension Team

Jack pine is an excellent case study in forest ecology, forest management and sociology. The species' survival strategy and ecological profile require management systems that are sometimes misunderstood — namely, clearcutting and/or prescribed burning. Nevertheless, management can provide multiple benefits while significantly reducing natural hazards inherent with jack pine ecology. Since much of our jack pine resource has matured and may experience catastrophic fire and budworm outbreaks over the next decade or two, it's important to take proactive management measures.

### The Tree

Jack pine is a true pine (*Pinus banksiana*) that is short-lived (approximately 80 to 100 years), relatively small (8 to 12 inches in diameter and 50 to 80 feet tall), and intolerant of shade. Jack pine is similar to lodgepole pine, pitch pine and pond pine from other regions in that it is especially adapted to reproducing itself after fires. It has two needles per bundle, each about 1.5 inches long, “burnt potato chip” bark and a generally scruffy appearance, and it typically grows in pure stands with few if any other tree species in the mix. Michigan's largest recorded jack pine



*Serotinous cones*

was 84 feet tall with a 30-inch diameter. On poorer sites, trees will be quite stunted and shrublike.

Cones are of particular interest. As is common among fire-adapted pines, roughly 75 percent of cones are “glued” shut (serotinous) and require temperatures of 120+ degrees F to open them, a job well-done by a fire. Opened cones are roundish and about 1.5 inches

across. The wood of jack pine can be made into a variety of products, from lumber to paper.

### Distribution

Most of the natural range occurs in Canada, with extensions into the northern Great Lakes states and Maine. It is the 17th most common tree in Michigan (out of 85 to 90 species). Jack pine grows most commonly on sandy, slightly acidic, infertile soils. Large areas of jack pine occur in the north central Lower Peninsula (about 1.3 million acres) and on sandy outwash plains in the Upper Peninsula (about 600,000 acres).<sup>1</sup>



*Staminate or male flowers of jack pine*

<sup>1</sup> Relative volumes and acreages of species are derived from the USDA Forest Service Forest Inventory and Analysis Data, available at [www.fia.fs.fed.us/tools-data](http://www.fia.fs.fed.us/tools-data)



## Ecology

Jack pine forest types are adapted to regular fire — sometimes severe fires. Stands are typically dry and loaded with fuel volume, especially older stands. In naturally regenerated jack pine forests, low-intensity ground fires may occur every 10 to 80 years. Fires kill some or all of the existing forest cover, remove competing plants, expose mineral soil, open cones and create ideal conditions for stand regeneration. Full sunlight promotes the growth and development of the new seedlings. Fire can also reduce fungal pathogens, insects and parasitic plants such as mistletoe.

About three-fourths of Michigan jack pine occurs in jack pine stands. A typical stand is often a natural monotype, or nearly so. Understory vegetation is sparse, allowing easy walking. Blueberries, sweetfern, bracken fern and reindeer lichen are understory plants closely associated with jack pine sites.

Jack pine grows rapidly for the first 20 years, then slows. At age 50, trees are usually 40 to 70 feet tall with a stand density around 100 to 120 square feet of basal area per acre (basal area is the cross-section area of stems at a height of 4.5 feet; an acre has 43,560 square feet), and a volume of 20 to 35 cords per acre (a cord is a pile of 8-foot logs that is 4 feet high and 4 feet wide).



*Clearcut jack pine*



*Multiple age classes*

Jack pine is usually considered a “pioneer” species in forest succession. Infertile soils typical of where the jack pine grows often lead to mature, pure stands of the species over time. On better sites, the forest may succeed to spruce, balsam fir, white pine or certain hardwoods, such as red maple or various oak species.

Kirtland’s warbler is the premier wildlife species associated with jack pine. It

is an endangered species well on its way to recovery through an aggressive management program on state and national forestlands. Many other species are associated with jack pine as well, including rare animals such as the black-backed woodpecker,

crossbills, sharp-tailed grouse and the pine-tree cricket; and more common animals such as deer, pine grosbeak, bluebirds, upland sandpipers, sandhill cranes, fisher, pine marten, spruce grouse and others.

## Management and Silviculture

Clearcutting is used to reproduce jack pine stands because it simulates the effects of fire.

Harvest is typically recommended around age 50. Sunlight reaching the exposed soil will cause cone-laden boughs close to the ground to experience temperatures in excess of 120 degrees, allowing the serotinous cones to open and release seed — up to 20,000 seeds per acre. Scarifying (exposing mineral

soil) helps ensure natural regeneration. A few trees may be left standing to provide seed over the next few years. Where natural regeneration fails or is incomplete, planting is necessary.

Forest managers attempt to diversify a jack pine landscape by creating multiple stands of varying age and structure. Expanses of jack pine are delineated into many units. Harvest and regeneration are staggered over many years to produce a mosaiclike pattern in the landscape. Benefits of stand diversification include a steadier timber flow, better Kirtland warbler habitat, reduced fire hazard, less severe budworm outbreaks, visual enhancement and blueberry development.

On better quality sites, conversion to other forest types can be considered. At lower levels of site productivity, jack pine may be the only tree that will grow. Management of these sites as barrens through frequent use of prescribed fire may be desirable — there are few true barrens left in Michigan.

## Tree Health Issues

Jack pine budworm (*Choristoneura pinus*) is a native insect that feeds on the flowers and needles of pines, especially jack pine. Budworm outbreaks are cyclical and damage the older stands the most, especially those trees with abundant male flowers. Outbreaks can result in high levels of mortality, which translate to increased fuel loads within three years. Budworm-damaged stands result in high fire hazard.

Other serious damaging agents include jack pine sawfly, bark beetles, white-tailed deer, porcupines, snow/ice breakage, windstorms, several rust diseases and Armillaria root rot.

## Landowner Tips

- Develop a management plan.
- Hire a forester to estimate volume.
- Selection harvesting will not regenerate a stand.
- Jack pine does not respond well to thinning.
- Consider planting as an alternative to natural regeneration.
- Evaluate the possibility of planting other species.
- Consider harvest after trees reach age 50.
- Slash should be scattered after cutting the stand.
- Jack pine forests are at high risk of wildfire.
- Employ “Firewise” defenses for buildings in jack pine forest types.

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See the Michigan Society of American Foresters’ publication, *Forest Management Guidelines for Michigan*, on their website: <http://michigansaf.org>.

National Firewise Program: [www.firewise.org](http://www.firewise.org).