



JACK PINE FOREST TYPE

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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 decisions.

The Tree

Jack pine is a true pine (*Pinus banksiana*) that is short-lived (~80-100 years), relatively small (8-12" diameter and 50-80' tall), and intolerant of shade. Jack pine is especially adapted to reproducing itself after fires, similar to lodgepole pine, pitch pine, and pond pine from other regions. It has two needles per bundle, each about 1.5" long, "burnt potato chip" bark, scruffy in appearance, and typically grows in monotypes. Michigan's largest recorded jack pine was 84' tall with a 30" diameter. On poorer sites, trees will be quite stunted and shrub-like.

Cones are of particular interest and common among fire-adapted pines. Roughly 75% are "glued" shut (serotinous) and require temperatures of 120+ degrees to open them, a job well-done by a fire. Opened cones are roundish, about 1.5" across. The wood of jack pine can be made into a variety of products, from lumber to paper. The "j" in jack pine is not capitalized.

Distribution

Most of the natural range occurs in Canada, with extensions into the northern Lake States and Maine. It is the 17th most common tree in Michigan (out of 85-90 species). Jack pine grows most commonly on sandy, slightly acidic, and infertile soils with large areas in the north central Lower Peninsula (about 1.3 million acres) and sandy outwash plains in the Upper Peninsula (about 0.6 million acres).¹



Serotinous Cones

**Staminate
or Male
Flowers of
Jack Pine**



Ecology

Jack pine types are adapted to regular fire, sometimes severe fires. These stands are typically dry and loaded with fuel volume, especially older stands. In naturally regenerated jack pine forests, there may be low intensity ground fires every 10-80 years. Fires will kill some or all of the existing forest cover, remove plant competition, 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 3/4 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 40-70 feet tall with a stand density around 100-120 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 20-35 cords per acre (a cord is a pile of 8-foot logs, 4 feet high and 4 feet wide).

Usually considered a "pioneer" species in forest succession, infertile soils typical of where the jack pine grows often leads to an edaphic or soil-related climax of jack pine. On better sites, the forest may succeed to spruce, balsam fir, white pine, or certain hardwoods.

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 forest lands. 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 & Silviculture

Clearcutting is the method used to reproduce jack pine stands, simulating the effects of fire. Harvest is typically recommended around age 50. Cone-laden boughs close to the ground will experience temperatures in excess of 120 degrees, allowing the serotinous cones to open and release seed. Non-serotinous cones also disperse seed. Scarifying (exposing mineral soil) helps ensure natural regeneration, with up to 20,000 seeds per acre. Additionally, a few trees may be left standing to provide seed over the next few years. Where natural regeneration fails or is incomplete, planting occurs.

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 mosaic-like pattern in the landscape. Benefits of stand diversification



Clearcut Jack Pine



Multiple Age Classes

include a steadier timber flow, better Kirtland warbler habitat, reduced fire hazard, lesser budworm outbreaks, visual enhancement, and blueberry management.

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, as 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 3 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, wind storms, several rust diseases, and Armillaria root rot.

Landowner Tips

- Develop a management plan
- Hire a forester for volume estimation
- Selection harvesting will not regenerate stand
- Jack pine does not respond well to thinning
- Consider planting as an alternative
- Evaluate possibility of planting other species
- Consider harvest after age 50
- Slash should be cut close to ground, 18 inches
- Jack pine forests are at high risk of wildfire
- Employ “Firewise” defenses for buildings in jack pine forest types.

See <http://michigansaf.org> about Forest Management Guidelines from the Michigan Society of American Foresters.

National Firewise Program: www.firewise.org

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