Forest Service

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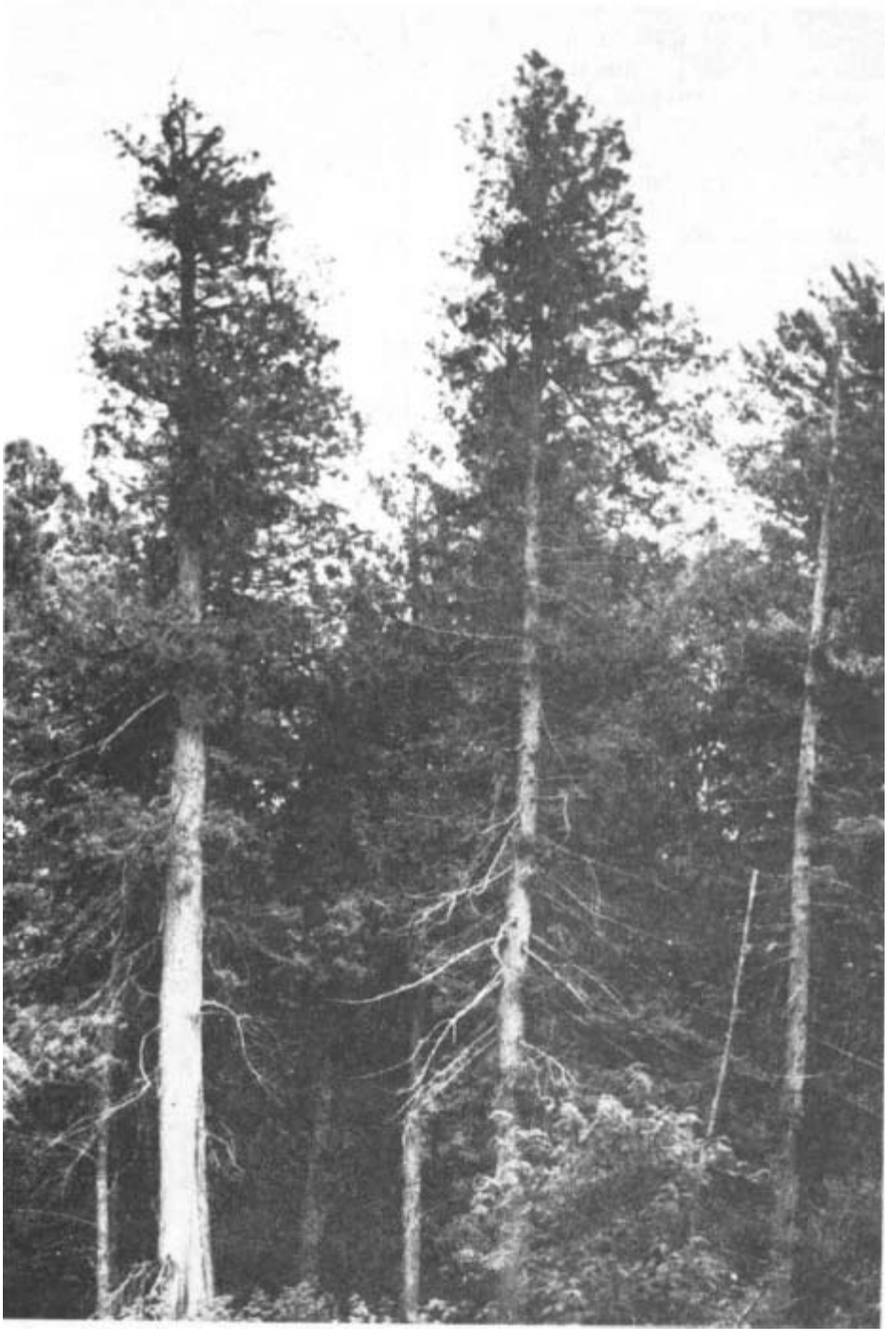
Northern White-Cedar

An American Wood

Northern white-cedar, the lightest of any commercial wood in the United States, grows primarily in the Lake States and Maine. It grows in both pure and mixed stands, mostly in swamps but also on uplands. The heartwood is resistant to decay and subterranean termites, is easy to work, glues well, holds paint well, and has little dimensional change. However, the wood is soft and has low mechanical properties such as bending strength and nail-holding ability. Recent uses have been principally for rustic fencing and posts. Other uses include cabin logs, lumber, poles, shingles, and several specialty products.



NOTE: This publication supersedes "Northern White-Cedar," unnumbered American Woods leaflet, 1945.

Northern White-Cedar

(Thuja occidentalis L.)

William F. Johnston and Matti J. Hyvarinen[1]

Distribution

The range of the northern white-cedar *(Thuja occidentalis L.)* extends mainly through the southern part of the eastern half of Canada and the adjacent northern part of the United States. Specifically, it extends westward from Nova Scotia to the southern part of James Bay and through central Ontario to southeastern Manitoba, and then south through central Minnesota and Wisconsin, along a narrow fringe around the southern tip of Lake Michigan and through southern Michigan, southern New York, and central Vermont and New Hampshire (fig. 1). The species also grows locally, north of the main range in northwestern Ontario and westcentral Manitoba, and south of the main range in Minnesota, Wisconsin, Illinois, Ohio, southern New England, and in the Appalachian Mountains from western Pennsylvania south to western North Carolina and eastern Tennessee.

In the northern and boreal forest regions, northern white-cedar forms its own forest type, and is an associate species in 12 other types. Trees commonly associated with the white-cedar, on the wetter soils, especially in swamps, are balsam fir, spruce (black, white, and red), tamarack, black ash, and red maple. On the better drained soils, especially on uplands, birch (yellow and paper), quaking aspen, eastern hemlock, eastern white pine, and American elm are commonly associated with white-cedar. The pure white-cedar type is usually considered to perpetuate itself, whereas associates tend to gradually replace white-cedar in mixed stands, particularly after disturbances.

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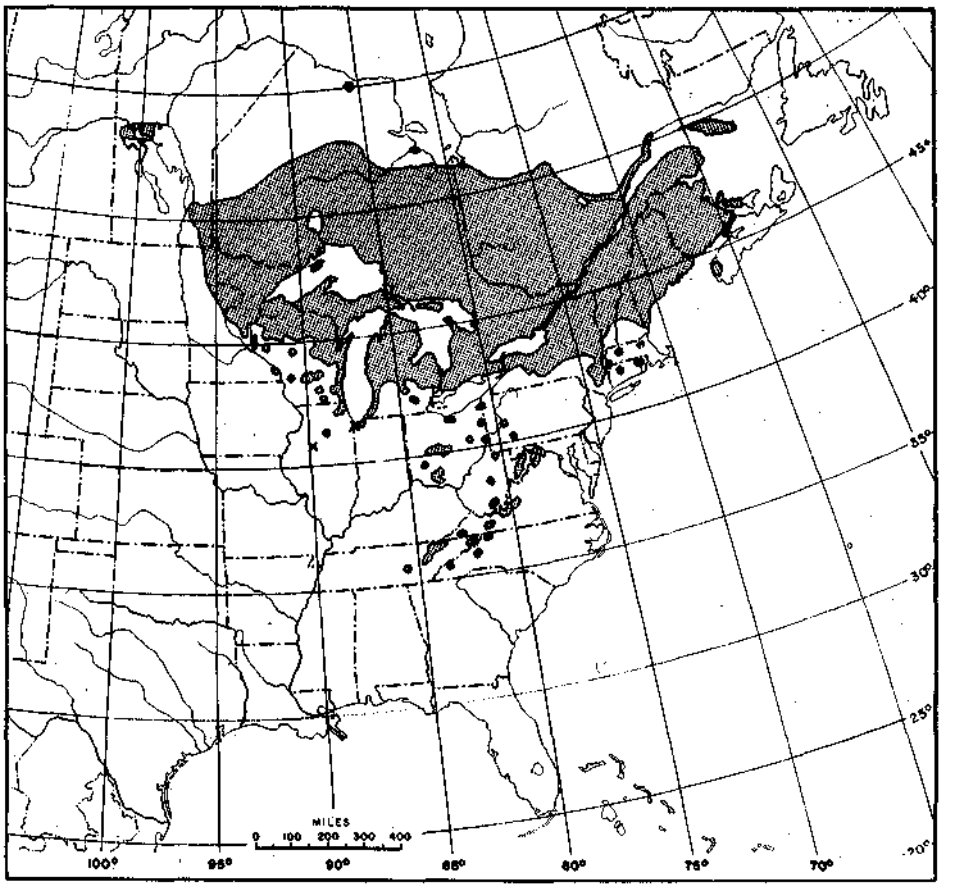

Figure 1.–Natural range of northern white-cedar. P-506671

Most commercial stands of northern white-cedar occur in swamps, but the species is also found on uplands. It generally grows best on neutral or slightly alkaline soils of limestone origin that are moist but well drained. The best swamp sites are usually near streams or other drainageways where the organic soil is well decomposed, neutral, or slightly alkaline, and has actively moving soil water. On uplands the species grows in scattered clumps or dense pure stands mainly on seepage areas, limestone uplands, and old fields.

Description and Growth

Northern white-cedar is a medium-sized tree, commonly 40 to 50 feet tall and 2 to 3 feet in diameter. A few trees grow as large as 80 feet tall and 6 feet in diameter.

The root system is relatively shallow, and tall trees that are exposed to the wind are subject to uprooting. Northern white-cedar is also susceptible to fire damage because the bark is thin and contains a relatively large amount of oil, and the shallow roots are often covered only by moss. Short trees are commonly damaged by white-tailed deer because the foliage makes a palatable and nutritious winter browse. In some areas, snowshoe hare browsing damages white-cedar reproduction as much or more than deer browsing.

Northern white-cedar cones are 1/3- to 1/2-inch long. The scale tips are rounded or have a very minute spine, and usually four scales are fertile (fig. 2). Seeds are 118-inch long, light chestnut brown, and have wings as wide as the body of the seed. Leaves are dull yellow-green, glandular-

Figure 2.–Leaves and open cones of northern white-cedar. F-525736

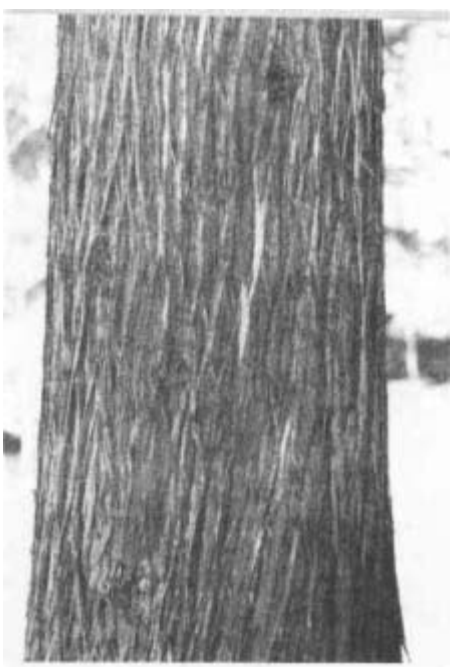

Figure 3.–Bark of mature northern white-cedar. F-525737

pitted, scalelike, and 118- to nearly 114-inch long. The bark is 114- to 113-inch thick, grayish to reddish brown, and fibrous, with interconnecting ridges and furrows (fig. 3). The trunk is often fluted and buttressed at the base, considerably tapered, and sometimes has butt rot in mature trees.

Good seed crops are produced every 3 to 5 years. Germination and early growth are best on moist seedbeds such as rotten wood, compacted moss in skid roads, and burns on both mineral and organic soils. Vegetative reproduction by layering is common in swamps. Northern white-cedar is tolerant enough of shade to withstand overtopping by its associates for several years and yet responds well to release at nearly all ages. So, depending on their history, white-cedar stands can be uneven-aged as well as even-aged.

Northern white-cedar generally grows more slowly than its associates and lives longer, reaching ages of 400 years or more in swamps. Growth rate is usually faster on uplands and in old fields than in swamps. It appears that good growth in both diameter and volume can be maintained in middle-aged stands through repeated thinnings of moderate intensity.

Common Names

The name commonly used is northern white-cedar, but others are white-cedar, eastern white-cedar, arborvitae, eastern arborvitae, and swamp-cedar.

Related Commercial Species

Northern white-cedar is listed separately as both a species and forest type in resource bulletins for States where it is abundant. In most other resource and market references, white-cedar is included merely under the entry "other softwoods.'' Sometimes "cedars" are listed as a group; a better but rare entry is "eastern cedars,'' which combines northern white-cedar, Atlantic white-cedar, and eastern redcedar.

Supply

Within its main range in the United States, stands of northern white-cedar occupied 3.2 million acres of commercial forest land[2] in the 1960's. These stands occur primarily in the Lake States and Maine. Sound white-cedar growing stock[3] totaled 3.0 billion cubic feet, 42 percent of which was in Maine and 31 percent in Michigan. This volume includes 5.4 billion board feet of sawtimber. In the 1960's, annual growth of white-cedar growing stock in the Lake States and Maine totaled 71 million cubic feet, which included 151 million board feet of sawtimber.

Production

In the 1960's, the annual harvest of northern white-cedar in the Lake States and Maine totaled 30 million cubic feet of growing stock, which included 65 million board feet of sawtimber. The amounts of growing stock and sawtimber removed in the Lake States were both far short of the desirable annual harvest, whereas in Maine harvesting exceeded growth, especially of sawtimber. Among these States, Maine accounted for 67 percent, and Wisconsin 4 percent. Maine's harvest of northern white-cedar more than doubled in board feet between 1958 and 1970, whereas Michigan's harvest changed little during roughly the same period.

Characteristics and Properties

Northern white-cedar has a thin layer of nearly white sapwood that surrounds the light brown heartwood; the growth rings are distinct, delineated by a darker band of late wood. The wood has a characteristic, pleasant aromatic odor of the "cedars." It is even-grained, finely textured, and has the lowest density of any commercial domestic wood. A cubic foot of air-dry wood weighs about 19 pounds.

[2]Land capable of producing industrial wood and not withdrawn from harvesting by law or regulation.

[3]Growing stock includes live trees 5 inches in diameter at breast height and larger. Sawtimber includes trees, 9 inches in diameter at breast height and larger.

The heartwood is resistant to decay and subterranean termites. Drying of northern white-cedar is easy. It has little tendency to shrink or warp. The wood is easy to work with hand tools and has average machining qualities. It glues well, holds paint well, and stays in place with little dimensional change. However, because of its low density, the wood is soft and has low mechanical properties such as bending strength, compressive strength, hardness, stiffness, shock resistance, splitting resistance, and nail- and screw-holding ability.

Principal Uses

In recent years northern white-cedar has been used principally for rustic fencing and posts. For example, Maine used 24 million board feet of white-cedar for fencing in 1970 and Michigan produced 2.9 million posts in 1972. Other important uses, at least in certain areas, include cabin logs, lumber, poles, and shingles.

Northern white-cedar sawtimber generally has a low yield of usable lumber because the logs are often knotty, crooked, or hollow. The better quality lumber is used for building construction in places where a high degree of durability is needed. The low grade material is used largely in the production of shipping containers.

In the past, northern white-cedar was one of the major species used for utility poles in the north central and northeastern United States. However, this use is minor today mainly because of the increased size required for electrical poles and the conversion away from telephone poles. Even though northern white-cedar is naturally resistant to decay and termites, most utility and building poles are now treated with preservative for additional service life.

Smaller amounts of northern white-cedar are used for piling, lagging, pails and tubs, ties, boatbuilding (especially canoe ribs), tanks, novelties, and woodenware. Small amounts are also used for fishnet floats, duck decoys, and imitation minnows.

Recently, in Michigan, small amounts of northern white-cedar have been used for pulpwood. The species makes acceptable kraft pulp; printability and opacity are excellent and strength is good. But debarking can be a problem, along with chipping, cooking, washing, and bleaching, unless special techniques are used. Further, northern white-cedar yields less pulp per cord than other species because of its low density. Recent tests indicate that white-cedar is also an excellent particleboard material.

A considerable amount of "cedar leaf oil" is made from northern white-cedar boughs by steam distillation and used in medicinals and perfumes. Boughs are also used for background and fillers in floral arrangements.

In addition, many varieties of northern white-cedar are used as ornamentals. Forest-grown trees, on the other hand, are valuable for wildlife habitat, particularly winter deeryards. White-cedar is highly preferred by white-tailed deer for both shelter and browse.

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