Chapter 37

Tamarack Cover Type

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Last Full Revision: 12/5/1990
Note- this chapter has not been fully revised since the restructuring of the Wisconsin Silviculture Guide, therefore some subject areas may be missing in the current version of this chapter.

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1 TYPE DESCRIPTION

1.1 Stand Composition and Associated Species

Stand Composition
More than 50 percent swamp conifers with tamarack (*Larix laricina*) predominant.

Associated Species
On organic soils, the tamarack cover type includes black spruce (*Picea mariana*), white spruce (*P. glauca*), and northern white cedar (*Thuja occidentalis*).

On mineral soils, this cover type includes quaking aspen (*Populus tremuloides*), paper birch (*Betula papyrifera*), red maple (*Acer rubrum*), and white pine (*Pinus strobus*).

Tamarack is usually associated with lowland brush (Chapter 50) because it has a relatively thin crown that passes sufficient light to allow the brush layer to develop.

1.2 Silvical Characteristics*

Table 37.1. Summary of selected silvical characteristics.

Species	Tamarack
Pollination	Late April to early May, depending on location. Male and female strobili occur separately and emerge before leaves appear, with male parts on young branchlets and female parts on older branches.
Cones Mature	Cones begin to form in June and ripen in mid-August to late September. Seed mostly falls by the end of October with the empty cones remaining on the trees for 2 to 5 years.
Seed Dispersal	Seeds are light in weight (averaging 318,000 seeds per pound), have long wings, and travel up to 200 ft. from the parent tree.
Good Seed Years	Good crops occur at intervals of 3 to 6 years, with some seed produced in intervening years. Best crops are found on vigorous, open-grown trees 50 to 150 years old. A medium-stocked stand may produce as many as five million viable seeds per acre in a bumper year.
Germination	Under forest conditions, internal dormancy is broken during the first winter. Germination occurs from late May to mid-June, peaking at soil surface temperatures of 65 to 70°F. The best seed bed is moist mineral soil or organic soil free of brush but with a light cover of herbs or grass. Hummocks of slow-growing sphagnum moss are also good seed beds if they are free of Labrador tea and associated with a stable water table. Fine textured mosses are also good.
Seed Viability	As much as 50 percent of seed fall may be destroyed by rodents. Red squirrels often cut cone-bearing branchlets and cache the cones. An undetermined Lepidoptera is also known to feed on developing seeds and may sometimes destroy as much as 40 percent of the crop. Seeds are also eaten by the American red crossbill. As a result of these losses plus those due to bacteria and fungi, only 4 to 5 percent of a seed crop may germinate.
Seedling Development	Because tamarack seedlings are small, they are easily killed in the first 6 to 8 weeks following germination. Early losses are primarily caused by

Species	Tamarack
	damping-off, with mechanical injury, drought, drowning and insects (especially the larch sawfly) contributing. Drought or drowning along with insufficient light may cause appreciable losses in the second and third years. For best growth, tamarack seedlings need abundant light and a constant water level. Seedlings established under fully stocked stands are usually only an inch tall at the end of the first year and do not survive beyond the sixth year. Under little or no cover, seedlings may be as tall as 7 to 9 inches the first year and 18 to 25 inches by the third year. From then on, with adequate light and good drainage, growth is rapid.
Growth	The growth rate of tamarack saplings depends largely on moisture conditions with slowest growth on water-covered stagnant swamps, and fastest growth on well-drained sites. Average height of mature trees is 50 to 75 ft., with occasional individuals reaching 100 to 115 ft. in height. Diameters of mature trees are usually 14 to 20 inches but a few may reach 36 to 40 inches. Trees 60 to 80 feet tall with 20 to 24 inch diameters were once common in the Lake States. Maximum age is generally 150 to 180 years. Growth of pole timber stands is generally 0.3 to 0.4 cord per acre per year, with better growth rates associated with higher stocking levels. Tamarack typically has a shallow, compact root system, one to two ft. in depth. On favorable sites it may spread over a radius greater than the height of the tree.
Shade Tolerance	Tamarack is very intolerant. Although it can tolerate a little shade during the first 3 to 4 years, it must become dominant to survive. The tree is a good self-pruner, and boles of 25- to 30-year old trees may be clear for one-half to two-thirds of their heights.
Major Pests	**Larch sawfly** (*Pristiphora erichsonii* Htg.) is periodically epidemic and may defoliate tamarack stands over large areas for several successive years. Growth of infested stands is greatly reduced and mortality is severe. The suggested prevention method is to avoid sparse stands, but this is considered to be difficult to attain because of tamarack's intolerance and scattered stocking pattern. Other pests include the **larch casebearer** (*Coleophora laricella*), **eastern larch beetle** (*Dendroctonus simplex*), **needle cast disease** (*Hypodermella laricis*), **heart rot** (*Fomes pini*), **butt rot** (*Polyporus schweinitzii*), and **root rot** (*Armillaria mellea*). **Flooding or unstable water levels** often kill established tamarack stands. Stands that survive very wet conditions usually grow very slowly. Avoid

Species	Tamarack
	blocking swamp drainage by road construction or by allowing beaver dams to impede drainage. **Windthrow**: Strong winds often uproot large tamarack trees growing in swamps or other wet sites where rooting is shallow. Avoid open-grown stands and maintain wind-firm residual densities.

* Information primarily from Fowells (1965).

2 MANAGEMENT GOALS, LANDOWNER OBJECTIVES

The management objective should be identified in relation to other land management objectives using the habitat type, if known, as the preferred indicator of site potential. Possible alternatives for tamarack include managing to produce the maximum quantity and quality of pulpwood and saw timber consistent with site potential and to maintain tamarack on sites where it now exists.

3 LANDSCAPE, SITE, AND STAND MANAGEMENT CONSIDERATIONS

3.2 Site and Stand Considerations

3.2.1 Soils

Tamarack can tolerate a wide range of soil moisture conditions and soil textures. It is most commonly found on moist organic soils, peats and mucks of swamps and muskegs, especially in the southern limits of its range. Best growth is observed on rich, moist, but well-drained, loamy soils along streams, lakes and swamps; in seep areas; and on shallow layers of mulch or well-decomposed peat over mineral soil.

3.2.2 Site Quality

3.2.2.1 Range of Habitat Types

Habitat types for swamp conifers were determined for upper Michigan (Coffman et al., 1980) and include TTM (Tsuga-Thuja-Mitella), TTS (Tsuga-Thuja-Sphagnum), PO (Picea-Osmunda), and PCS (Picea-Chamadaphne-Sphagnum). However, these types are based on very limited sampling and have not been adequately studied to offer useful management information.

5 SILVICULTURAL SYSTEMS

Even-age management will be applied.

5.1 Seedling / Sapling Stands

Allow stand to develop naturally.

5.2 Intermediate Treatments

In all cases, if at least 20 years prior to rotation, reduce basal area stocking level to 100 sq. ft. whenever stand becomes operable.

5.3 Natural Regeneration Methods

5.3.1 Even-Age Regeneration Methods

1. When at least 60 percent millacre stocking of vigorous advance regeneration will remain after logging, clearcut stand at site index rotation age. Rely on existing regeneration to stock future stand.

2. When there is inadequate advance regeneration, clearcut in strips when stand reaches site index rotation age. Divide the stand into strips, 3 chains wide, at a right angle to the prevailing wind (generally from the southwest). Clearcut the most leeward strip and each successive third strip. When 60 percent millacre stocking of one-foot tall seedlings has been attained, clearcut the next series of strips windward of the newly regenerated strips.

   When the second series of strips has regenerated, cut the third series leaving scattered dominant seed trees at 100-ft. spacing to regenerate the final strip. All other residual stems larger than 2 inches DBH, should be removed to favor regeneration as soon as each strip is cut or shortly thereafter.

   Dense stands will require disposal of slash to provide proper seed bed. If mixture of black spruce, cedar, or balsam fir is adequate to carry fire, slash can be burned. Otherwise whole tree skidding or bunching of slash will be necessary.

   Where alder is dense, brush should be burned, sheared, chopped or flailed off during or immediately after logging to provide sufficient seed bed for tamarack. Research indicates that tamarack seedlings can compete successfully with alder when alder is cut or otherwise killed back to ground level, due to tamarack's relatively fast growth rate.

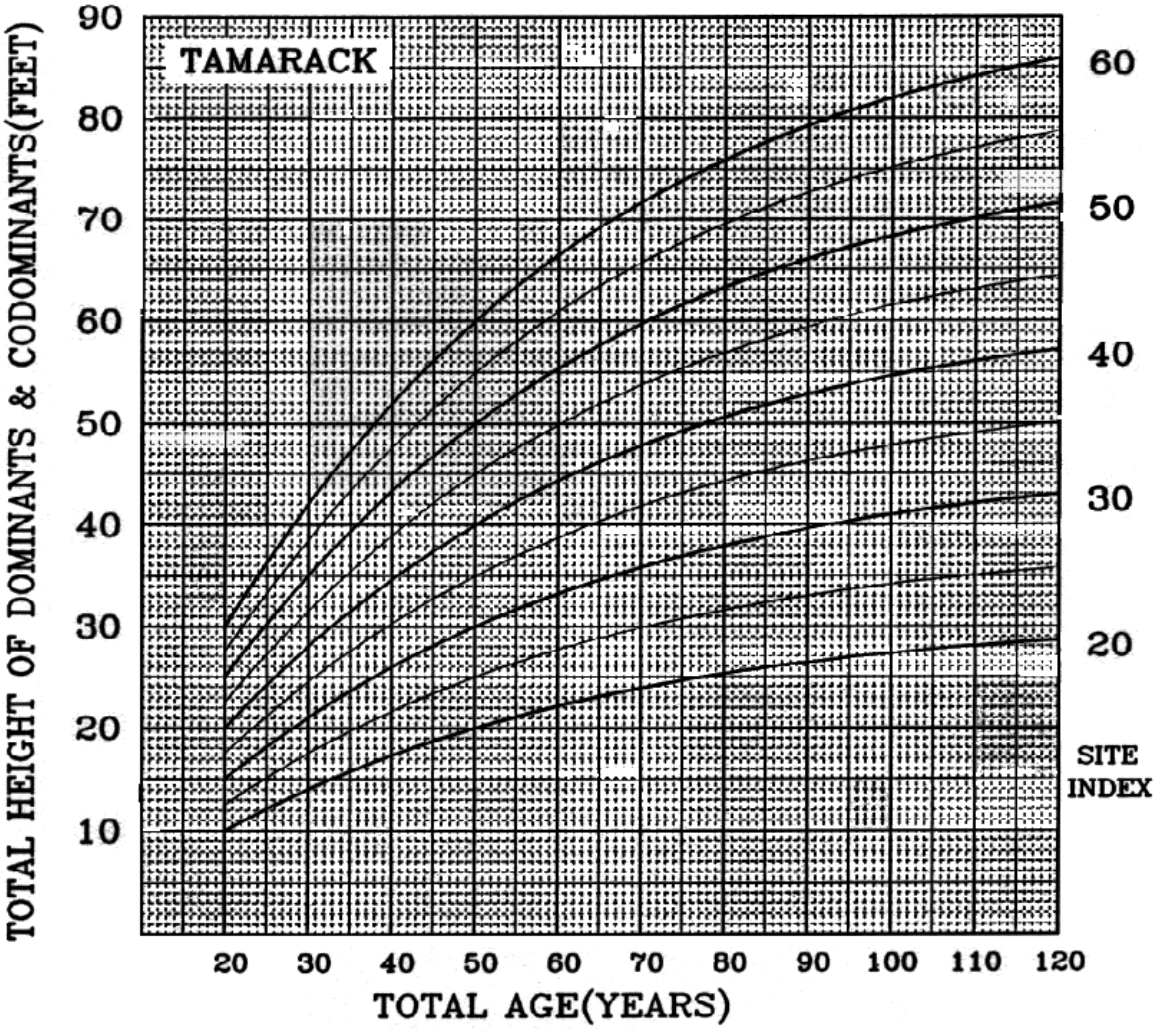
5.4 Artificial Regeneration

Tests on tamarack plantations in northern Wisconsin indicate that local seed sources give the best height growth results.

Direct seeding may become a viable alternative in regenerating tamarack if seed becomes readily available and seeding techniques are developed.

8 APPENDICES

Rotation Age					
Other Sites					
Site Index	60	50	40	30	20
Rotation Age	80	90	100	120	130+
Mineral Soil Sites			70		



Tamarack (Gevorkiantz 1957d)
Minnesota
Number of plots and number of dominant and codominant trees not given
Total height and total age, anamorphic, equation not given
Convert d.b.h. age to total age by adding years according to site index (BH = 0.0):

SI:	20	30	40	50-90
Years:	12	10	7	5

	b_1	b_2	b_3	b_4	b_5	R^2	SE	Maximum difference
H	1.5470	1.0000	-0.0225	1.1129	0.0000	0.99	0.52	1.4
SI	0.6464	1.0000	-0.0225	-1.1129	0.0000	0.99	0.52	1.4

Figure 37.1. Site index curves for tamarack (Carmean et al. 1989).

9 REFERENCES

Benzie, J. W. 1963. Research Paper LS-4, Cutting methods in mixed conifer swamps, Upper Michigan. USDA-Forest Service, Lake States For. Exp. Sta.: St. Paul, MN.

Carmean, W. H., J. T. Hahn, and R. D. Jacobs. 1989. General Technical Report NC-128, Site index curves for forest trees in the eastern United States. USDA-Forest Service, North Central For. Exp. Sta.: St. Paul, MN.

Coffman, M. S., E. Alyanak, J. Kotar, and J. E. Ferris. 1980. *Field guide to habitat classification system for upper peninsula of Michigan and northeast Wisconsin.* Michigan Technological Univ.: Houghton, MI. 144 pp.

Craighead, F. C. 1950. Miscellaneous Pub. No. 657, Insect enemies of eastern forests. USDA-Forest Service: Wash., D. C.

Drooz, A. T. 1956. Forest Pest Leaflet 8, The larch sawfly. USDA-Forest Service, Lake States For. Exp. Sta.: St. Paul, MN.

Duncan, D. P. 1952. Forestry Notes No. 7, Reproduction cutting in tamarack. Univ. Minnesota: St. Paul, MN.

Fowells, H. A. 1965. Agric. Handbook No. 271, *Silvics of forest trees of the United States.* USDA-Forest Service: Wash., D. C. p. 227-234.

Jeffers, R. M. 1975. Research Note NC-190, Survival and growth of tamarack planted in northern Wisconsin. USDA-Forest Service, North Central For. Exp. Sta.: St. Paul, MN.

Johnston, W. F. 1975. Reproducing lowland conifer forests. J. Forestry, vol. 73, no. 1, p. 17-20.

Johnston, W. F. 1973. Research Note NC-153, Tamarack seedlings prosper on broadcast burns in Minnesota peatland. USDA- Forest Service, North Central For. Exp. Sta.: St. Paul, MN.

Roe, E. I. 1957. Station Paper No. 52, Silvical characteristics of tamarack. USDA-Forest Service, Lake States For. Exp. Sta.: St. Paul, MN.