

Restoring Lake Superior's Coastal Forest

A primer for landowners and managers

Produced by

 **Sugarloaf**
THE NORTH SHORE STEWARDSHIP ASSOCIATION

Ecology of the Coastal Forest

The North Shore of Lake Superior's combination of cool summer temperatures and shallow soil has led to a unique coastal forest community. Some plant species, like thimbleberry, tall bluebell, and mountain ash find a particularly good environment in the coastal forest. White cedars also do well near the Lake. In fact, a forest type called Upland White Cedar Forest was once common along the North Shore while rare elsewhere in Minnesota. This is especially true within the first mile of the shoreline, where lake-effect climate is most influential.

Minnesota Department of Natural Resources (DNR) ecologists have identified three native plant community types that are uniquely associated with the North Shore coastal forest: *Upland White Cedar Forest*, *North Shore Spruce-Fir Woodland*, and *Lake Superior Bedrock Shrubland*. The DNR defines native plant communities as "groups of native plants that interact with each other and with their environment in ways not greatly altered by modern human activity or by introduced organisms." Classifying plant communities provides a common language for those involved in using, restoring, or conserving the resources in Minnesota's native plant communities.

UPLAND WHITE CEDAR FOREST

In this community, white cedar is the dominant canopy tree in a forest also composed of quaking aspen, paper birch, balsam fir, white spruce, and sometimes white pine. Starflower, bluebead lily, and wild sarsaparilla are the most common plants in the ground layer.

NORTH SHORE SPRUCE-FIR WOODLAND

This community's open tree canopy is composed of balsam fir, white spruce, paper birch, and black spruce. The forest floor is covered by many species of lichens and mosses. The soil is particularly thin with a lot of exposed bedrock. Low shrubs like blueberry and bush honeysuckle are common. Common flowers include Canada mayflower, bunchberry, and large-leaved aster.

LAKE SUPERIOR BEDROCK SHRUBLAND

On cliffs and rocky outcrops, this community is composed of patchy vegetation of shrubs, wildflowers, grasses, sedges, lichens, mosses, and scattered trees that are often stunted by the thin soil. Common shrubs include Juneberry and hawthorns. Trees include balsam fir, white spruce, paper birch, and mountain ash. Lichens rather than mosses cover areas of exposed bedrock.

For more information about Minnesota's Native Plant Communities, visit www.dnr.state.mn.us/npc

What happened to the Coastal Forest?

Although examples of these native plant communities are found along the North Shore, the coastal forest looks much different today than it did before European settlement. Logging in the late 1800s and early 1900s removed most of the pines and cedars. Severe fires swept through the slash that was left behind, and the forest that has grown back is heavily dominated by paper birch and quaking aspen. With few older pines and cedars to provide seeds, these trees have not returned to most parts of the shore.

In addition to the logging and severe slash fires in the early 1900s, other factors have also fundamentally altered the ecology of the coastal forest. Periodic fires that drive the natural cycles of vegetation change have

been suppressed. Periodic fires reduce fuels, prepare the ground for pine regeneration, release minerals and nutrients from the soil, create a mosaic of habitats for wildlife, and reduce the build-up of shrubs.

Equally important, the white-tailed deer population has greatly increased. The presence of deer, especially the high populations of deer in winter and spring, has dramatically changed the forest. Deer browse conifers very heavily in the winter and spring, when their summer diet of green leafy material is gone. This keeps natural succession to conifers from occurring. White cedar is a favorite food. A common sight on the North Shore is a white cedar tree with every branch under seven or eight feet gone. Cedar seedlings can survive under deep snow, but will be eaten to the ground when exposed.



White cedar browsed by deer

Deer also seek out white pine and balsam fir seedlings and saplings. Red pine is less favored, but in a long, harsh winter, it too will be browsed. Finally, bucks will rub their antlers on saplings, so even a ten-foot tree may not be free of deer damage.

PRIME EXAMPLES OF COASTAL FOREST ALONG THE NORTH SHORE

While much of the North Shore coastal forest has been disturbed or destroyed, there are numerous sites where it is found, primarily in these wonderful Minnesota State Parks.

- Palisade Head
- Shovel Point in Tettegouche State Park
- Cascade River State Park, picnic area east of the river

From Highway 61, you can also see nice stands of native conifers, especially white pine, by the Encampment River and west of Beaver Bay. These are on private land; please enjoy them from the highway.

Why Restore the Coastal Forest?

The original conifer forest is not returning on its own. As the birch trees die off, there is little new conifer growth to succeed them. Historically, at this point in the forest's life cycle, conifer species like red and white pine, spruce, and cedar that are capable of living for centuries would assume dominance thereby maintaining a well-stocked and diverse forest until the next major fire starts the cycle again.

From an ecological perspective, sustaining and reestablishing forest diversity and structure will maintain and improve:

- the quality of water moving through this portion of the Lake Superior watershed, ultimately affecting the water quality of Lake Superior;
- soil retention and its ability to support vegetation and retain water;
- habitat for the full complement of native flora and fauna;
- carbon storage; and
- resiliency to withstand and recover from extreme weather events.

From a human values perspective, sustaining and reestablishing forest diversity and structure will maintain and improve:

- the scenic quality of the North Shore; and
- the famous attractions of the North Shore (vistas, fishing, hiking, skiing, hunting, bird watching, and biking), which will benefit the tourism and local service industry.

A concerted effort of *all* North Shore landowners is needed for the long-term restoration and preservation of this forest and the protection of the streams associated with it.



How can the Coastal Forest be Restored?

If you are a North Shore landowner, chances are your forest does not resemble the original coastal forest. However, with a little effort, you can restore your forest. The best way to begin is by planting trees.

Planting Trees

Before you begin planting, there are a few factors to consider.

SELECTING YOUR SITE

Once the decision is made to dedicate an area to planting trees, the area needs to be analyzed to determine the best species suited to growing on the site. The soil type, and other factors such as depth to the water table, exposure to sun and wind, moisture availability, other species present, history of the land and future land use may need to be identified.

Typical challenges you may encounter are:

DYING BIRCH

In many North Shore locations, entire stands of birch are dead or dying. Paper birch has a naturally short lifespan of 80-120 years. Much of the birch on the North Shore began growing in the early 1900s. Multiple other factors, including drought, forest tent caterpillars ("army worms"), the bronze birch borer beetle, and the March 2009 ice storm have sped up this decline. Near residential developments, clearing for roads and houses has added to the stress on the trees. Many of the soil types and the south facing slopes are not suited to good birch forest growth.

COMPETITION

A native grass called bluejoint (*Calamagrostis canadensis*) tends to fill in forested areas where there is

enough sunlight and soil moisture, especially if there has been past soil disturbance. The grass prevents young conifer seedlings from establishing. Dying birch forests provide an ideal habitat for bluejoint.



Bluejoint (*Calamagrostis canadensis*). Dave Powell, USDA Forest Service, Bugwood.org

Other grasses and shrubs also stifle new tree growth. Alder and hazel are common understory shrubs that will shade out seedlings.

OLD FIELDS

Particularly in areas near historic North Shore settlements, previous landowners have intentionally kept areas clear for grazing animals, commercial uses, or just to maintain a lawn. As a result, the soil may be compacted and a monoculture of non-native grass is in place. Natural succession is severely limited in these areas.

With this information, use Table 1 on this page to help you select the best tree species for your site.

PREPARING THE SITE FOR PLANTING

Site preparation is one of the most important, yet most neglected aspects of tree planting. Site preparation helps eliminate weed and brush competition that can kill or greatly reduce growth of newly planted tree seedlings.

Grass should be removed or killed back in a 3' by 3' square. Once planted, the seedling must then be protected from grass regrowth with a 3' by 3' "mulch mat" or by a 3 to 4" layer of wood chips or pine needles.

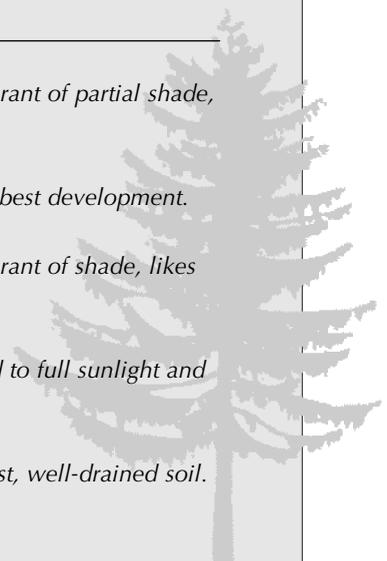
Tree Planting

CHOOSE YOUR STOCK TYPE

Trees for restoration planting most frequently are available from nurseries as bare-root, plug, or containerized seedlings. Bare-root seedlings and plugs can be an economical option and may require less digging than when using larger containerized trees. Larger containerized trees typically are trees that come in one gallon or larger containers. Plugs are grown in small tube-like containers. They are often shipped with or without the container. One advantage of plugs left in the container and containerized stock includes a longer window of time for planting. Seedlings left in the containers can be cared for much like potted plants while bare-root seedlings need to be planted soon after getting them from the nursery.

TABLE 1

COASTAL FOREST TREE <small>(in order of frequency)</small>	WHERE TO PLANT
WHITE CEDAR	<i>Grows best on medium to heavy soils and although quite tolerant of partial shade, likes full sunlight.</i>
BALSAM FIR	<i>Although very shade tolerant, requires abundant moisture for best development.</i>
WHITE SPRUCE	<i>Grows best on medium to heavy soils and although quite tolerant of shade, likes full sunlight.</i>
WHITE PINE	<i>Although adaptable to most sites, grows best in areas exposed to full sunlight and having rich, moist, well-drained soil.</i>
RED PINE	<i>Found on a wide variety of sites. Prefers full sunlight and moist, well-drained soil. Uncommon in the coastal forest, except in plantations</i>



BARE ROOT TREE PLANTING TIPS

1. Planting in the spring can be started as soon as the ground is free from frost and can continue as long as the tree seedlings have not become moldy or broken dormancy. Fall planting can be successful, however seedlings may not be available.

2. It is important to limit the time between taking tree seedlings from their nursery “beds” and planting them at a permanent site. Anything that can be done to shorten this time period will increase survival of the tree seedlings. This means keeping the packaged seedlings in a cool (35 to 50°F), dark, location, keeping the roots moist and planting them as soon after getting them from the nursery as possible.

3. Protect tree seedlings before and during planting. Anything that causes tree seedlings to warm up or dry out before they are planted will decrease survival. Exposing roots to sunlight and drying winds can cause seedling mortality.

4. Be sure the seedlings are planted straight, with roots spread out in the planting hole. Planting with a shovel can be slower than using a planting bar. However, a shovel can be used to prepare the planting site and loosen the soil creating conditions more favorable to root growth.

5. Plant at the proper depth. Find the root collar just above where the roots flare out from the stem, and plant the seedling at the depth of the root collar at or just below ground level.

6. Heel in bare-root seedlings if planting is delayed for more than a few days. If you need to postpone your planting operations for more than a few days, it is best to heel in the seedlings. Dig a trench in a shady location and spread out the seedlings in trench. Cover the seedlings with dirt and water them well.

For more planting tips, see references on page 7.

Protection

Damage by deer is the single largest obstacle to restoration of the North Shore coastal forest. Deer especially like to browse white cedar and white pine, two important components of the coastal forest. The

population of deer on the North Shore, especially in late winter, can be overwhelming.



White pine seedling protected by five-foot galvanized fencing and T-post.

TO FENCE OR NOT TO FENCE

Planting seedling trees on the North Shore requires strong, durable protection from deer. One solution is a wire cage, either for individual trees or for small groups. For a single seedling, you will need a “T-Post” or other sturdy post, six to eight feet of 5-foot or 6-foot galvanized fencing, a post pounder, and either wire or cable ties for binding. If the inside of the cage is large enough that a deer could jump in, you will need an eight-foot fence and 10-foot posts. Another solution is a fenced enclosure, which is a fenced area with at least 8-foot fencing.



White cedar trees in a fenced enclosure. Note lack of deer browsing.

BUD CAPPING

Bud capping is a common means to protect conifer seedlings. However, the deer pressure on the North Shore is often too high for this to be effective.

REPELLENTS

Due to the high population of deer on the North Shore, repellents have had limited success. One reason

is the repellents wash off with each rainfall. One company, *Repellex* (www.repellex.com), sells tablets that may be placed in the soil around the newly planted trees. The tablets contain capsaicin, the same compound found in hot peppers, and a carrier to allow the seedling to take up the capsaicin. Deer may be deterred from feeding on trees treated with these tablets.



Note: This listing is not an endorsement of these businesses and products, nor is it a complete listing. Businesses wishing to be included in future editions of this booklet should contact Sugarloaf at sugarloaf@boreal.org or (218) 525-0001.

Commercial sources of trees

Boreal Natives

3943 Munger Shaw Road
Cloquet, MN 55720
218-729-7001

borealnatives@prairieresto.com

www.prairieresto.com/boreal_natives.shtml

Specializing in locally grown native seed and plant materials. Provide professional restoration services.

Gunflint Gardens

51 Mort Meadows
Grand Marais, MN 55604
218-387-2469

Bob Sopoci has an inside track on many native trees and plants.

Hammarlund Nursery

P.O. Box 247
159 N. Esko Road
Esko, MN 55733
218-879-3600

<http://www.hammarlundnursery.com>

Full service landscape center with a wide variety of plants grown on site including some native species.

Itasca Greenhouse

26385 Blackwater Road
PO Box 273
Cohasset, MN 55721
1-800-538-8733

www.itascagreenhouse.com

Economical source of containerized seedlings throughout the planting season. Also planting and protection supplies.

Leaning Pine Native Landscape Company

3130 South Camp Amnicon Rd.
South Range, WI 54874
715-398-5453

Specializing in lakeshore restoration.

North Central Reforestation, Inc

10466 405th Avenue
Evansville, MN 56326
1-877-702-5579

www.ncrtrees.com

Specializing in containerized and bare root seedlings. Also planting and protection supplies.

Maxwells Woodland Nursery

6185 Lax Lake Road
Finland, MN 55603
218-353-7726

Larger regional nursery with a wide variety of plants including some native species.

Government sources

South St. Louis County SWCD
215 North 1st Avenue East
Room 301
Duluth, MN 55802
218-723-4867

www.southstlouisswcd.org/treeshrub.html

Common economical source for bare-root seedlings and transplants. Plants come in bundles of 10 or 25.

Minnesota State Forest Nursery
PO Box 117
Akeley, MN 56433-0117
218-652-2385 or 800-657-3767

www.dnr.state.mn.us/forestry/nurseries

Minimum order of 500 trees. Seedlings can only be planted within Minnesota.

Transplanting

Permission of the owner is required to dig and move plants from public or private land in Minnesota. One source for transplanting native plants are new housing developments, where site clearing for construction requires removal of native vegetation.

Fencing, posts, mulch mats, etc.

Most hardware stores and home improvement retailers either stock fencing and posts or can order them. For specialized supplies such as mulch mats, you may want to shop online. Online suppliers include:

Forestry Supplier - www.forestry-suppliers.com

Ben Meadows - www.benmeadows.com

Terra Tech - www.terratech.net

Bailey's - www.baileysonline.com

Itasca Greenhouse - www.itascagreenhouse.com

For More Information

Websites

Minnesota DNR Tree Care

www.dnr.state.mn.us/treecare

University of Minnesota Extension

www.extension.umn.edu/woodlands

My Minnesota Woods

www.myminnesotawoods.umn.edu

North Shore Forest Collaborative

www.northshoreforestcollaborative.org

Cook County Invasive Team

www.cookcountyinvasives.org

Natural Resources Conservation Service – Duluth office

4850 Miller Trunk Highway, Suite 2B

Duluth, MN 55811

218-720-5209

www.mn.nrcs.usda.gov

White Pine planting and care

www.dnr.state.mn.us/treecare/whitepine/index.html

Tree planting and care

www.dnr.state.mn.us/treecare/woodlot_prepare.html

North Shore Soil and Water Conservation District offices

Staff at these offices can help with tree planting, including planting advice and more.

South St. Louis County SWCD

215 North 1st Avenue East, Room 301

Duluth, MN 55802

(218) 723.4867

www.southstlouisswcd.org

Lake County SWCD

616 3rd Avenue

Two Harbors, MN 55616

(218) 834-8370

<http://tinyurl.com/lakecountyswcd>

Cook County SWCD

Cook County Courthouse

411 W. 2nd Street

Grand Marais, MN 55604

(218) 387-3647

www.cookswcd.org

Sugarloaf: The North Shore Stewardship Association

6008 London Road
Duluth, MN 55804

NON-PROFIT ORG.
U.S. POSTAGE

PAID
PERMIT NO. 721
DULUTH, MN



Sugarloaf's mission is to inspire the preservation and restoration of the North Shore's unique environment through education and exemplary stewardship, especially at Sugarloaf Cove.

For more information, visit Sugarloaf Cove at 9096 W. Highway 61 near Schroeder, call 218-525-0001 or visit www.sugarloafnorthshore.org

Some of this booklet excerpted and adapted with permission from the Minnesota SWCD Forestry Association Tree Handbook.

Available as a PDF from www.maswcd.org/Partner_Links/tree_care_handbook.pdf or from local SWCD offices. Mike Reichenbach, Extension Educator, University of Minnesota assisted with the editing of the 2012 edition.

This publication was funded in part by the Biodiversity Fund of the Duluth Superior Area Community Foundation and by the Coastal Zone Management Act, by NOAA's Office of Ocean and Coastal Resource Management, in conjunction with Minnesota's Lake Superior Coastal Program. December 2012.