

# PLANTING WETLAND TREES AND SHRUBS

## TECHNICAL GUIDANCE DOCUMENT

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### INTRODUCTION

Wetland trees and shrubs are typically planted when wooded swamps and shrub wetlands are a goal for a wetland project, or if woody plants will help meet specific functional goals. Planting trees and shrubs in wetlands is still a relatively new science and more information is needed to improve survival and growth rates. Some estimates show that it may take 35-50 years before restored or created forested wetland sites have wetland vegetation and wildlife similar to mature forested wetlands due to plant mortality and slow growth rates of nursery stock (Perry et. al.). The rate of establishment depends on the restoration strategy and size of plant materials used, and the amount of maintenance provided. Planting strategies chosen for a project often depend on the type of community to be restored, project goals, and budget. Equipment needs for projects can include tree planting bars, spades, shovels, augers, tractor pulled planters, containerized trees and shrubs, bare root trees and shrubs, cuttings, tree and shrub seed, tree protectors and watering equipment.



Speckled Alder Seedling

### APPLICATION

The ground layer, shrub layer, and canopy layer should receive equal consideration during the planning for shrub and forested wetlands. Seed of herbaceous plants along with tree and shrub seed is typically planted first into a shrub or forested wetland restoration. Bare root and containerized shrub and tree species are planted into areas where seed has already been installed.

Planting bare root trees in soils that stay saturated for most of the year is not recommended, as too many fibrous roots are lost during transplanting; the trees will die before the fibrous roots grow back (Garbisch, 1994). Studies by McIninch et.al., (1994) have shown that wetland woody species grown in mesic conditions are more adaptable to wetlands than plants grown under saturated or partially saturated conditions. Ultimately, it is important to pay attention to hydrology when planning tree and shrub plantings. Some species such as tamarack and white cedar can benefit from being planted on mounds within wetlands. Natural forested wetlands have varying elevation changes that have developed from fallen trees, root masses, animal activity, and frost heave that support a wide variety of plant species. Working to create microclimates within forested wetlands may help increase survival rates and species diversity.



Soil compaction can prevent tree and shrub root growth. Heavy equipment should be used only on dry soils; frost rippers may be beneficial on some sites to break up compaction.

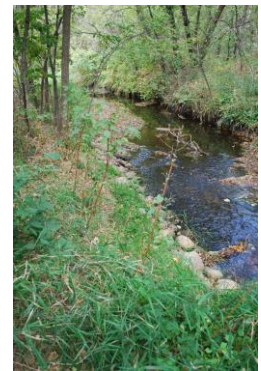
Soil tests can help determine if soils need amendments such as compost or slow release fertilizer and if the pH is within target ranges, between 4.5 to 6.5 for most communities. It is often impractical to amend soil over large acreages, so soil is often amended as trees and shrubs are planted by mixing compost or other amendments into the planting holes.

The goal of most forest and shrub wetland projects is to obtain a stem density similar to a natural community. In some cases, trees and shrubs are planted at higher densities than is found in natural communities to create greater competition for weeds. In this strategy, trees and shrubs are sometimes planted ten feet apart. This strategy will increase initial costs but may decrease maintenance needs.

**Planting Wetland Tree and Shrub Seed** -Tree and shrub seed can be seeded along with wetland grasses, forbs, and sedges or woody plant seed can be installed separately. The advantage of seeding trees and shrubs is that it can be relatively inexpensive and high densities of seedling trees and shrubs can decrease mortality from deer and rabbits. It can take a while for trees and shrubs to establish from seed, so it is common to plant bare root and containerized plants in addition to seed.

Trees & Shrubs Commonly Planted in Forested Wetlands		
Common Name	Botanical Name	Installation level above water table
Red maple	<i>Acer rubrum</i>	2-3 feet
Tamarack	<i>Larix laricina</i>	1-2 feet
Black ash	<i>Fraxinus nigra</i>	1-2 feet
Speckled alder	<i>Alnus rugosa</i>	0-1 foot
Red osier dogwood	<i>Cornus sericea</i>	1-2 feet
American black currant	<i>Ribes americanum</i>	1-2 feet
Meadowsweet	<i>Spiraea alba</i>	1-2 feet

**Installing Tree and Shrub Cuttings** - In spring, certain species of trees and shrubs can be grown from cuttings (cut twigs or branches). They include nannyberry, red osier dogwood, willows, cottonwoods, alder, and poplars. Collection should occur in late winter or early spring, a few weeks prior to bud burst for spring plantings. For fall plantings, cuttings should be collected around the time that most leaves have fallen off. Cuttings should be 1½ to 4 feet long and ½ to 2 inches in diameter and from relatively young trees/shrubs. There has also been success with planting larger diameter, pole size cuttings of willow and cottonwood installed in existing reed canary grass stands (Antieau, C., 2006). Branches used for cuttings should be cut with a pruning shears to achieve a clean cut.



Red-osier dogwood cuttings

Cutting should be stored above zero degrees F. Cuttings can be refrigerated between 31 to 40 degrees F and 60 to 70 percent humidity. Frozen cuttings can be stored with snow to reduce drying. Cuttings can be stored over winter if necessary but should be monitored for drying, sprouting, or mold (Alaska Dept. of Fish and Game 2005).

Cuttings can be placed in moist sand or water to keep them cool and hydrated before planting. The plantings can be soaked for 24 to 48 hours (not more than four days) before planting to improve survivability (Alaska Dept. of Fish and Game 2005). Planting should occur shortly after the ground thaws and as late as July 1 if conditions are favorable. Plant cuttings into saturated soil three to ten feet apart depending on the eventual size of the species (around 10-15 feet is a sufficient spacing for most shrubs in a restoration). It is recommended to make holes in the soil using metal re-rod to prevent the loss of buds as cuttings are installed. One-half to two-thirds of the cutting should be placed in the soil depending on the length of the cutting. Typically, cuttings are installed one to two feet into the ground. It is important that the soil remains moist until the cuttings have developed a root system.

In some cases, cuttings are placed in buckets or tubs of water until they develop root systems. Once roots are sufficiently developed the plants can be transplanted. This technique works best when transplanting can occur relatively early in the season when soil moisture is high or when installing into saturated soil.

**Planting Bare Root Wetland Trees and Shrubs** - Bare root trees and shrubs come in a wide range of sizes from six-inch tall seedlings to ten-foot tall trees. Seedlings are the most common type of bare root material planted in wetland projects. Generally, 100 to 500 bare root trees/shrubs are planted per acre depending on the wetland type to be restored and the size of material installed. Trees and shrubs are often planted in clusters, where a cluster consists of 5 individuals of a species spaced evenly around the perimeter of a circle with a diameter of approximately 20 feet. Clusters of individual species should be spread randomly over the site in the appropriate area for each species being planted. Areas are determined by site hydrology and light conditions. Clusters of different species may overlap. An advantage of planting in clumps is to aid monitoring of survival rates. Unless the site is already saturated, the trees and shrubs should be watered at the time of planting.

**Planting Containerized and Ball and Burlap Wetland Trees and Shrubs -**

Containerized trees and shrubs can vary greatly in size from one gallon containers to 25 gallon trees. Large plants can also be obtained as balled-and-burlapped material. Cost is a limiting factor in the use of containerized and ball-and-burlap material.

Containerized woody plants tend to have higher survival rates than bare root trees and shrubs. Holes dug for containerized plants should be 2.5 times the diameter of the container. This will ensure that the roots will have room to grow.



It is most important that the hole is the widest near the surface where fibrous roots will grow. It is also beneficial to scarify the edges of the hole to create a transition from the undisturbed soil to the backfill soil. Proper planting depth is very important with containerized plants. The “root flair”, or point where the roots flare out, should be no more than one inch below the surface after planting. Deeper placement can lead to roots that grow in a circular manner around the tree, causing tipping and constriction of the stem.

The following are guidelines for planting containerized and bare-root wetland trees and shrubs in wetland restoration sites:

- Plant on a day with low wind and cool temperatures and before a rain if possible.
- Keep roots moist and protected during transport and planting.
- Dig planting holes at least twice the diameter of the root mass.
- If trees and shrubs will be planted in a mound, the excavation should occur before any seeding or other planting occurs.
- When planting seedlings with spades or dibble bars, make holes large enough to accommodate spread-out root masses.
- Ensure the root collar of trees and shrubs is within one inch of the surface.
- Roughen the sides and bottom of the planting hole with a shovel.
- Loosen roots on the edge of containers and spread-out roots of bare root material.
- If the planting hole is not already saturated, add water, backfill half of the hole, add more water, and then add remaining soil.
- Lightly tamp the soil surface.
- Add mulch if possible to retain moisture and inhibit weeds.

**Protecting Trees and Shrubs** - Wetland trees such as white cedar that are extremely vulnerable to deer browsing and need protection. 14-gauge wire with 2x4 inch openings can be used to create four-foot diameter by five-foot tall deer exclosures. Fencing of this size does not require posts as the base can be buried in soil or woody debris (Wagner 2007).

Bud caps can also be used to deter deer for some species. They are particularly important for seedling white pine but can also protect deciduous trees and shrubs. Wire screening can be placed around tree and shrub stems to prevent girdling from rodents.

Follow-up watering is important for establishing trees and shrubs. If soils are not saturated, plantings should be receiving approximately one inch per week at a minimum through rainfall or watering.



Tree shelter in a wetland restoration

## **OTHER CONSIDERATIONS**

When trees and shrubs are used in wetland plantings, care should be taken to ensure that spot treating of weeds and mowing do not eliminate seedlings from a site. Large buckets can be placed over seedlings for protection when conducting herbicide application. Trees and shrubs will require protection from deer in the form of bud caps or exclosures; however, this is not practical for very large sites where large numbers of seedlings have been planted.

## **COSTS**

The costs for planting trees and shrubs can vary significantly depending on the size and type of plants and whether mulch, tree mats, or tree protection will be used. Bare root plants cost between \$3.00 and \$15.00 installed, while containerized plants cost between \$25 and \$100.00 installed. Tree protection tends to add \$2.00-\$10.00 per tree. As a general rule the installed cost of individual woody plants is 2-2.5 times the cost plants. Direct seeding of trees and shrub seed (including site preparation, seed and planting) tends to be around \$700-\$900 per acre.

## **ADDITIONAL REFERENCES**

Restoration and Creation of Forested Wetlands: A Guide, Palmintier, C., Appleton, B.

Revegetation Practices in a Seasonal Wetland Restoration in Minnesota, Bohnen, J.L., Galatowitsch, S.M.

Minnesota SWCD Tree Handbook, USDA