

# Streamside Planting Guide



*for  
Western Washington*

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# RIPARIAN AREAS

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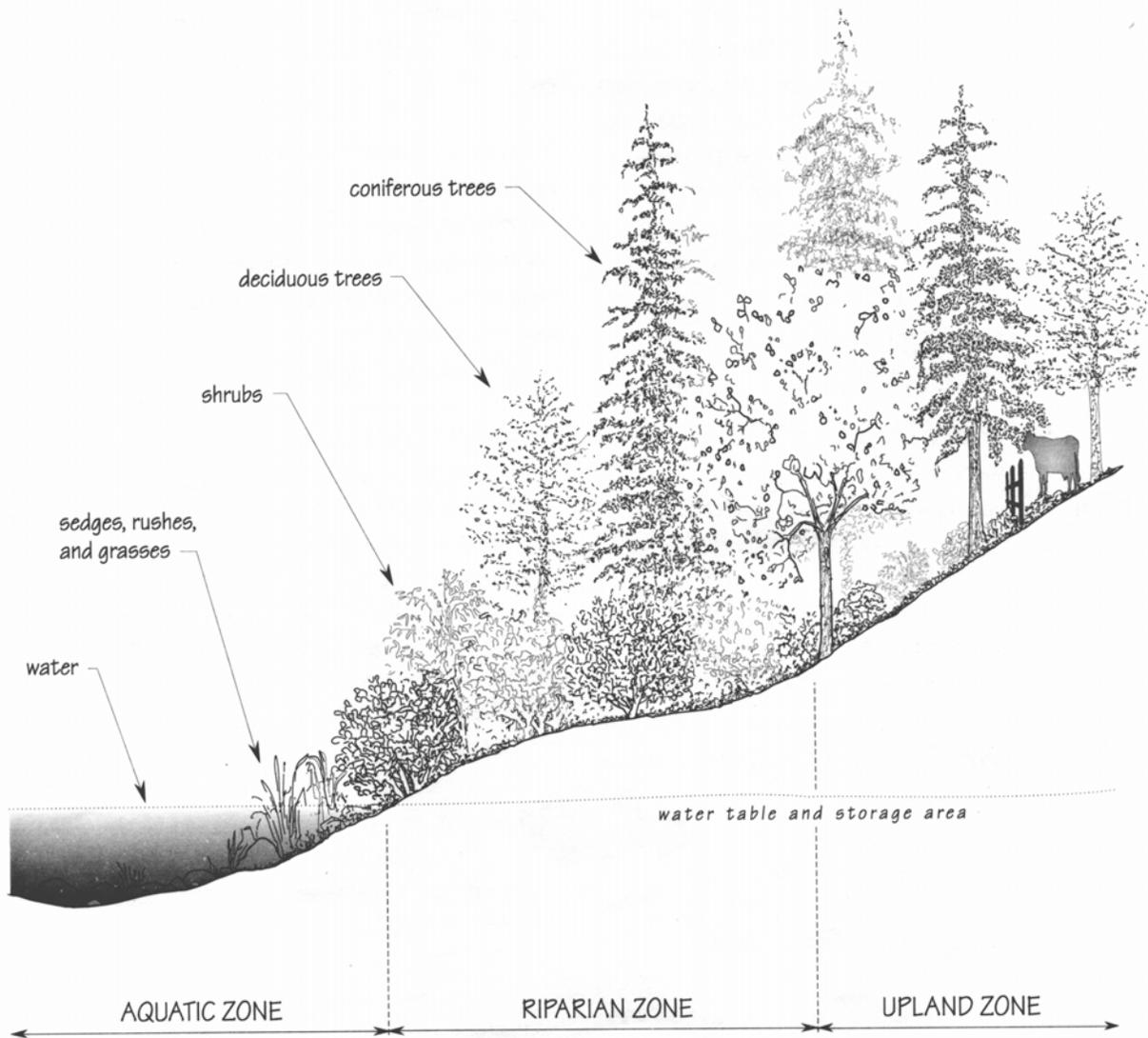
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# RIPARIAN AREAS

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This planting guide is designed to assist Pacific Northwest residents in the selection and planting of trees and shrubs for riparian zone enhancement.

The riparian zone is the zone of vegetation adjacent to water bodies such as streams, rivers, and lakes. Planting shrubs and trees adjacent to streams can stabilize streambanks;

improve fish and wildlife habitat by providing shade, cover and food; and filter sediment which could otherwise degrade water quality.

Many riparian zones in the Pacific Northwest have excellent potential for enhancement. This publication provides basic information for restoring riparian zones.

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# RIPARIAN AREAS

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## FEATURES AND FUNCTIONS

Riparian areas include the trees and other plants that live and grow near water on the banks of streams, river, and lakes. Many of the plants are water loving, and their roots must stay moist to complete their life cycles. The typical broad-leaved riparian trees lose their leaves in the fall, while conifer dominated riparian areas provide cover all year long. The vegetation under the trees is usually diverse, with a wide variety of shrubs, grasses, and wildflowers. A healthy riparian area is evidence of wise land management.

## Improved Water Quality

When floodwaters overflow the banks of the stream or river, riparian vegetation slows the floodwater so that it can no longer carry its load of sediment and the sediment settles out. Riparian areas also filter runoff and sediment from slopes next to the stream. Excess nutrients draining from pastures or fertilized fields can be absorbed by riparian plants. This may reduce the potential for harmful algal blooms and excessive aquatic plant growth in the stream.



Art provided courtesy of the Adopt a Stream Foundation from *Adopting A Stream: A Northwest Handbook*

## Water Storage & Flood Reduction

Healthy riparian areas with abundant trees and other vegetation act like a sponge and absorb excess water during spring snowmelt and other flood periods. Some of the water slowed by riparian areas enters the groundwater and is released later, thereby increasing late summer and fall stream flow. Ground water is a vital and renewable resource that we rely upon for our water supply.



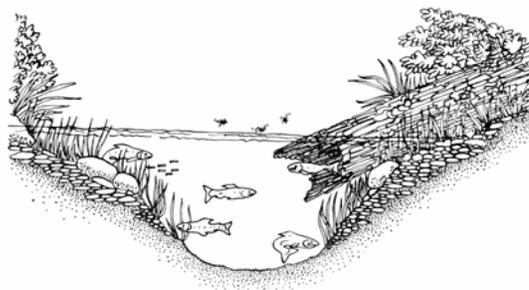
Art provided courtesy of the Adopt a Stream Foundation from *Adopting A Stream: A Northwest Handbook*

## Cover and Shade

Riparian areas produce an abundance of cover and shade. The shade keeps water temperatures cool for fish and water-loving animals. The vegetation cover provides shelter, food and temperature relief for many birds and other animals.

## Improved Fish Habitat

Fish depend upon healthy riparian areas for food, shelter, and a year-round supply of clean, cool water. Overhanging vegetation provides a home for insects which are a key food source for fish and other aquatic life in the food chain.



Art provided courtesy of Oregon Department of Fish and wildlife from *The Stream Scene*.

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# RIPARIAN AREAS

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## Improved Wildlife Habitat

A variety of birds, ranging in size from hummingbirds to bald eagles, find food, cover, and nesting sites in riparian areas. Many birds depend on riparian areas to complete their life cycle. Rapidly growing riparian vegetation produces a multi-storied habitat important for a diverse bird population. Mammals often visit and live in riparian areas. Beaver, otter, and mink depend on riparian zones for food and cover. Trees and shrubs provide cover for deer and elk. A well-vegetated streambank offers an excellent travel corridor for wildlife.

## Improved Biodiversity

Biodiversity is the diversity of life in all its forms and levels of organization, including plants, animals, and micro-organisms. A riparian zone consisting of pasture with several kinds of grass does not provide extensive biodiversity. One with large coniferous and deciduous trees, a mixture of shrubs, and extensive instream woody material has a higher level of biodiversity, resulting in an increased capacity to prevent stream erosion, provide fish and wildlife habitat, and improve water quality.

## Enhanced Aesthetics

Riparian areas offer cool shade, pleasant scenery, and wildlife viewing. Fishing and water activities are major attractions. People often seek riparian environments for activities such as picnicking, hiking, and camping.



Art provided courtesy of the Cornell Cooperative Extension from *Pond and Stream Safari*.

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## WHAT DOES VEGETATION DO FOR A STREAM?

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Planting streambanks with native woody plants can provide many benefits including the following:

### Filtering

A strip of vegetation along a stream, called a "riparian zone", acts as a filter, intercepting bacteria or chemicals, which could otherwise enter the water. Excess nutrients draining from pastures or fertilized fields can be blocked from entering the stream and absorbed by the plants. This will reduce algal blooms in the stream and help maintain oxygen levels available to aquatic life.

### Food

Leaf litter from trees and shrubs feeds insects and other invertebrates that provide food for fish. In-stream logs diversify the stream's flow providing pools for resting fish, riffles for feeding, and gravel deposits for spawning. Woody material can also slow the erosive energy of the stream and prevent sediments from flowing downstream.

Trees and shrubs also add beauty to the natural landscape.



Art provided courtesy of the Adopt a Stream Foundation from *Adopting A Stream: A Northwest Handbook*

### Erosion Control

The root systems of the plants prevent erosion by holding in place the soil and gravel in the streambank. Woody and herbaceous plants on streambanks can slow the flow of runoff and floodwaters by absorbing energy. Healthy deep-rooted plants maintain the soil's capacity to absorb water, helping to prevent flooding in the winter.

### Habitat

Trees and shrubs adjacent to the stream provide cover for wildlife to protect them from predators. A well vegetated streambank provides an excellent travel corridor for wildlife. Riparian vegetation provides food for wildlife as well as a home for many nesting birds. Beavers use riparian vegetation for building dams and lodges which in turn slows the erosive energy and stores water that prolongs stream flows in the summer.



### Shade

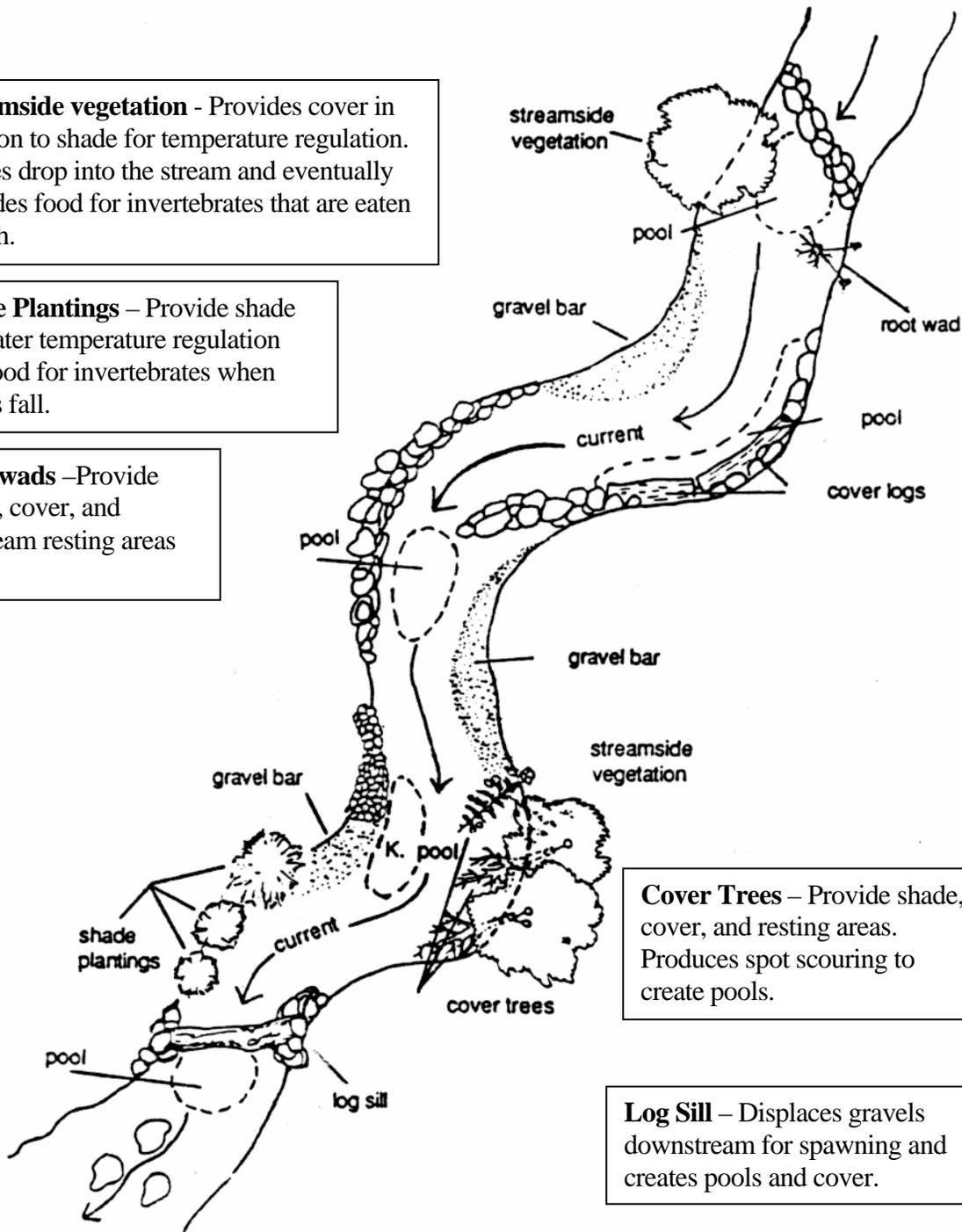
Vegetation shades the stream from high summer temperatures and insulates the stream from extreme cold in the winter. Cool water temperatures in summer allow the stream to hold more oxygen. More oxygen means larger and healthier fish and invertebrate communities. Air temperatures that are not extreme are beneficial to mammals, birds, and other wildlife.

# WHAT DOES VEGETATION DO FOR A STREAM?

**Streamside vegetation** - Provides cover in addition to shade for temperature regulation. Leaves drop into the stream and eventually provides food for invertebrates that are eaten by fish.

**Shade Plantings** – Provide shade for water temperature regulation and food for invertebrates when leaves fall.

**Root wads** – Provide shade, cover, and in-stream resting areas



**Cover Trees** – Provide shade, cover, and resting areas. Produces spot scouring to create pools.

**Log Sill** – Displaces gravels downstream for spawning and creates pools and cover.

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## CHOOSING A STREAMSIDE PLANTING SITE

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Choosing a planting site is an important part of insuring the success of a riparian re-vegetation project. Several factors, listed below, should be considered before trees and shrubs are planted along a stream. Your local CONSERVATION DISTRICT and USDA Natural Resources Conservation Service office can assist you in choosing a proper planting site.

### Soils

The soils of the planting site should be conducive to growing trees and shrubs. Some soils have a high percentage of sand, which does not hold water like clay/loamy soils. Certain plants do not survive well in sandy soils due to the lack of water holding capacity. Other soils may be too wet to support certain types of vegetation. It is important to analyze the soil on the particular site before planting begins.

### Streambank Condition

Planting trees close to or on an eroded streambank is not advised because as the tree gets large, its weight can pull the tree into the creek uprooting the streambank and increasing the erosion. Shrubs may be a better alternative when planting along relatively unstable portions of the streambank

### Available Light

It is important to consider how much shade and sun there is in a planting site before choosing the species to be planted. For example, western red cedar seedlings can survive under a canopy of shade, but alder can not. The direction each streambank is facing will influence the conditions for the plants;

southern facing banks are typically more dry and sunny than northern facing banks.

### Stream Characteristics

Streams are naturally dynamic; they periodically flood or form new channels. Sometimes these changes can be predicted, but most of the time streams are unpredictable. It is important to plant trees and shrubs according to the current and possible future characteristics of the stream. Planting in relatively stable areas will increase the likelihood of long term survival of the trees and shrubs. Because many streambank planting projects are based on stabilizing unstable streambanks, it is important to plant species in these zones that become established quickly and have tenacious rooting systems like willows.

### Existing Vegetative Cover

If the site is dominated by blackberries or a thick stand of reed canary grass the chance of getting trees and shrubs established is remote in these sites unless certain vegetation control measures are taken. Trees and shrubs will have a much higher survival rate if they are planted with minimal vegetative competition. Although blackberries and reed canary grass do provide some streambank protection, trees and shrubs provide much better stabilization due to their extensive root systems. In addition, trees and shrubs provide more diverse fish and wildlife habitat.

### Livestock Access

Livestock should not have access to the trees or shrubs because they can heavily browse the vegetation and prevent their establishment. If livestock are present they must be fenced from the planting zone.

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## RIPARIAN VEGETATION

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### CHOOSING THE RIGHT TREE AND SHRUB SPECIES

Choosing the right tree and shrub species is critical to the success of a planting project. Planting species that are readily adapted to a particular planting site increases their chance to survive.

Planting a variety of species makes the area attractive to a wide variety of wildlife. Because tree and shrub species have different roots that vary in density and depth, planting a variety of species also increases the effectiveness of anchoring the soil. Ideally, both coniferous and deciduous trees and shrubs should be planted.

The largest seedlings or cuttings available should be planted because they tend to compete better with the existing grasses. Older and larger plant materials have more extensive root systems and more stored nutrients in their stems and roots.

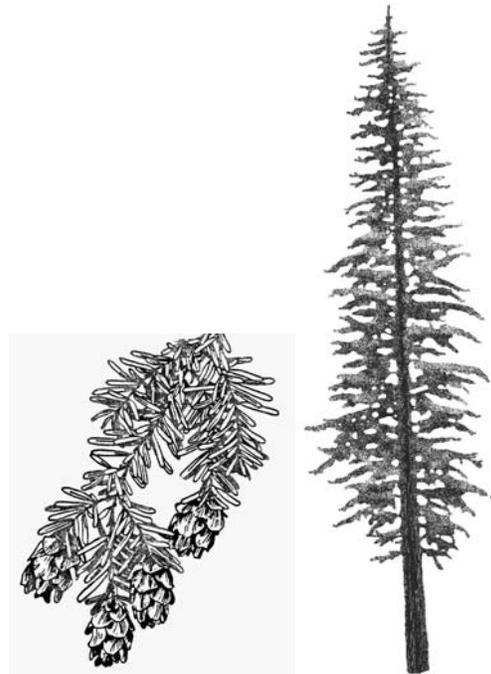
Only native species to Western Washington are included in this guide because they are best adapted to this climate and are of most value to the wildlife of this region. Most of these species are available from local nurseries.

The following sections detail the natural history of some of these trees and shrubs. Moisture and light requirements can be found on the table following plant descriptions.

### TREE SPECIES FOR STREAMBANK PLANTING

Western Hemlock

*Tsuga heterophylla*



Western hemlock ranges along the coastal regions of the West from southeastern Alaska to the southwestern United States. It grows from sea level to 7,400 feet elevation. The seedlings of the western hemlock are able to grow in dense shade, giving it an advantage in established forests over other tree species. Western hemlock can live for over 1,000 years. It can be recognized by its drooping tip. Growing as tall as 200 feet, it is prone to being toppled by the wind because of its shallow root system. It is also susceptible to forest fires because of its thin bark. Hemlock stands are important nesting habitat for a number of birds such as junco and warblers. The seeds provide an important food source for chickadees, blue grouse and red squirrel. The bark contains tannin for making leather. Native Americans boiled the bark to make a red-brown dye and used the pitch medicinally.

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## RIPARIAN VEGETATION

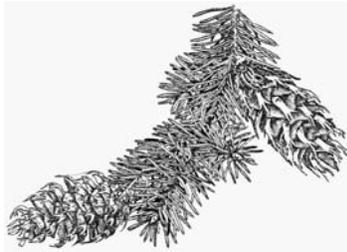
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Douglas-fir



*Pseudotsuga menziesii*



Douglas-fir was named after explorer and botanist David Douglas who identified this tree in Oregon in the 1820's. Douglas-fir ranges from British Columbia to New Mexico, but reaches its largest size in the Northwest. One of the largest trees in the world, it can reach 340 feet in height and 15 feet in diameter. The bark of this tree can grow to a foot thick, which makes the tree resistant to fire. In fact, fires have contributed to making Douglas-fir a dominant species in the Northwest by clearing surrounding trees. This tree has excellent wood strength and is used extensively for lumber. It is a common Christmas tree. The seeds of the Douglas-fir are a food source for birds, shrews, chipmunks and field mice. Deer eat the new shoots of Douglas-fir seedlings and bears lick the sap of young trees.

Western Redcedar



*Thuja plicata*



Western redcedar grows from Alaska to northern California and east to Montana. It prefers cool, moist habitats such as riparian zones, ravines and bottomlands. The bark of this tree is stringy and fibrous and peels off in narrow strips. The base of the trunk widens rapidly from the main trunk into the soil. Western redcedar is anchored by a shallow, widely spreading root system. The leaves of the western redcedar is made up of tiny, scale-like leaves about 1/8 of an inch long. The leaves and branches give off a pleasant aroma. This tree can reach enormous size. One western redcedar growing in the Olympic National Park is over 200 feet in height and 20 feet in diameter.

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## RIPARIAN VEGETATION

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Bigleaf Maple

*Acer macrophyllum*



Bigleaf maple, common in Northwest forests, stretches from Alaska to Oregon. The bigleaf maple is aptly named. Its leaves are 8-12 inches wide with five deeply indented lobes and leaf stalks 6-12 inches long. Bigleaf maples can reach 80 feet in height with a trunk of 4 feet in diameter. Common in Pacific Northwest riparian zones, this tree is very beneficial for wildlife. The fruit or "helicopters" provide food for squirrels, finches and grosbeaks. Many birds nest in its large branches. In the spring, the bigleaf maple produces yellow blossoms which are a favorite of bees.

Native Americans used the bark for making ropes and the wood for carving utensils and paddles. Today, the bigleaf maple is commercially used for firewood and lumber.

Red Alder

*Alnus rubra*



A fast grower, red alder can reach 15 feet in five years. Red alder are often the first tree species to colonize areas after a disturbance such as a timber harvest or fire. Alder improve sites by enriching the soil with nitrogen. It also

serves as a natural firebreak because the leaves resist the spread of fire. Extensive stands of these trees intermix with conifers from Alaska to California. Although they thrive in upland areas, the alder prefers the moist, rich soils of riparian zones. Several bird species like goldfinch and siskin eat alder seeds. Deer and ruffed grouse browse on the leaves. Beavers use the young, tender branches to construct dams and lodges.

Black Cottonwood

*Populus trichocarpa*

Black cottonwood is the tallest broad-leaf tree in the Northwest. It can reach 175 feet in height and 10 feet in diameter. Black cottonwood is found along the Pacific coast from Alaska to California and east to North Dakota. One of the reasons it survives so well in dry climates is its ability to store large quantities of water in its trunk. Cottonwood trees are important for birds. Eagles, ospreys, and blue herons commonly use the crown of black cottonwood for their nests. Woodpeckers, horned owls, wood ducks, raccoons and flying squirrels live inside the trunk. Young black cottonwood is a favorite tree of beavers, which eat the bark for food and use stems and branches to make their lodges and dams. Although black cottonwood grows quickly, the wood tends to be fragile and brittle and thus not desirable for building purposes. However, the wood is used to make boxes and crates and cottonwood pulp is excellent for making high grade paper.

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## RIPARIAN VEGETATION

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### SHRUBS SPECIES FOR STREAMSIDE PLANTINGS

Red-Osier Dogwood      *Cornus stolonifera*



Red-osier dogwood is one of the most common shrubs found in Canada and across the northern United States. It is found along streams and beneath the shade of giant conifers such as Douglas-fir and Sitka spruce. Red-osier dogwood produces clusters of white flowers in spring. These flowers turn into a white, juicy fruit by the summer. The fruit are popular with birds such as quail, ruffed grouse and wood ducks. White-tail and mule deer, rabbits and elk browse the reddish twigs. These red twigs are particularly obvious in the winter months making red-osier dogwood a popular ornamental species. Because this low growing, thicket-forming shrub has a dense root system, it is very effective at stabilizing streambanks.

Red Elderberry      *Sambucus racemosa*



In summer, red elderberry is laden with cream-colored flowers and later clusters of dark, red berries. This fruit is a valuable source of food for game birds, songbirds, and small mammals. Deer graze on the twigs and foliage. Native Americans whittled flutes out of the twigs. Today, elderberries often serve for landscaping homes and gardens. Red elderberry covers a vast range, stretching from British Columbia to California, east to Texas, and north to Montana. Elderberry prefers moist soil in open areas of coniferous forests. It is often found along streams, canyons roads and fences and is common in western Washington forests.

Vine Maple      *Acer circinatum*



Vine maple is a shade tolerant shrub that is commonly found in the understory of western hemlock and Douglas-fir forests. If exposed to light from an opening, it can grow up to 30 feet tall. Vine maple grows from British Columbia to Northern California primarily on the western side of the Cascades. Quinault Indians wove baskets to carry clams and fish from straight shoots of this shrub. Vine maple is beneficial for riparian areas for a number of reasons. Because it spreads out over streams, insects that eat the leaves can fall into the water providing food for fish. Also, its roots help stabilize the soil.

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## RIPARIAN VEGETATION

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Oceanspray

*Holodiscus discolor*



Oceanspray, also known as creambush and arrow-wood, is found in riparian areas and upland forests from British Columbia to California and Montana. It is one of the most abundant flowering shrubs in the Pacific Northwest. Oceanspray is an understory shrub providing habitat for small mammals and forage for deer and elk. During summer, oceanspray has showy cream-colored flower clusters up to a foot long. Native Americans made arrows from oceanspray's straight branches. Many tribes used oceanspray for fire tongs because it does not readily burn. It is a popular ornamental shrub. Oceanspray survives well in wet and dry sites and on steep slopes. It readily resprouts when grazed.

food for the birds. Recently, the USDA Natural Resource Conservation Service tested Sitka alder in Western Washington riparian zones. Early research indicates that this is a good bank stabilizer, especially on soils low in nitrogen, due to Sitka alder's nitrogen fixing ability. Sitka alder also does well where willows are found, and can be added to diversify a willow planting site.

Willow species

*Salix spp.*



There are over 100 species of willow in the United States and Canada. Willows are generally found in moist soils along streams, meadows, and lakes. Native Americans used willows to smoke fish, make baskets and stretch animal skins. The bark, when pounded and applied to skin wounds, is reputed to have healing properties. Twine made from bark was strong enough to serve as a harpoon line for sea-lion hunting. Deer, elk, and rabbits eat the buds, leaves, and young branches. Beavers use willow for building dams and lodges. Several species of birds such as blue grouse eat the buds. Willows can be susceptible to borer insects. Willows are relatively short-lived but tend to resprout readily. They hold the soil in place and prevent erosion with their dense, interlacing root systems. Willow cuttings can be planted directly into the streambank, because they can grow roots from buds on the branches, and are especially valuable where sandy, gravelly soils occur.

Sitka Alder

*Alnus sinuata*



Sitka Alder is usually found in the Pacific Northwest at elevations above 3,000 feet, but it occasionally extends to sea level. This shrub prefers moist areas such as riparian zones or near wetlands. Sitka alder rarely exceeds 10 feet in height, although some specimens reach 30 feet. The small seeds in alder cones provide

## RIPARIAN VEGETATION

<i>TREE SPECIES</i>	<i>METHOD OF PROPAGATION</i>	<i>HABITAT VALUE</i>	<i>FORM &amp; SIZE</i>	<i>ROOTING CHARACTER</i>	<i>CULTURE</i>
Bigleaf Maple <i>Acer macropyllum</i>	seedling	squirrels, finches, and evening grosbeaks eat the seeds	trees to 100 feet	shallow roots	moist, dry soil, sun-part shade
Black Cottonwood <i>Populus trichocarpa</i>	cuttings	eagles and osprey perch and nest in branches	trees to 80 feet	shallow, fibrous roots	wet-moist soil; sun
Douglas-fir <i>Psuedotsuga menziesii</i>	seedling	black bears eat sap of young trees	trees to 340 feet	shallow roots	moist-dry soil; sun
Red Alder <i>Alnus rubra</i>	seedling ; cuttings, suckers	birds eat seeds	trees up to 80 feet	shallow, strong, lateral roots	moist-dry soil; sun-shade
Western Hemlock <i>Tsuga heterophylla</i>	seedling	deer browse foliage	trees from 100 -160 feet	shallow roots	moist soil; shade
Western Redcedar <i>Thuja plicata</i>	seedling	raccoons and skunks den in cavities made by root buttresses	trees from 150 -200 feet	shallow roots	moist-wet soil; shade

<i>SHRUB SPECIES</i>	<i>METHOD OF PROPAGATION</i>	<i>HABITAT VALUE</i>	<i>FORM &amp; SIZE</i>	<i>ROOTING CHARACTER</i>	<i>CULTURE</i>
Black Twinberry <i>Lonicera involucrata</i>	cuttings	many species of wildlife eat the berries	spreading shrub to 10 feet	shallow, spreading roots	wet-moist soil; shade
Cascara <i>Rhamnus purshiana</i>	cuttings	pileated woodpeckers eat the berries	shrub or small tree to 30 feet	shallow roots	moist-dry soil; sun-shade
Hazelnut <i>Corylus cornuta</i>	seeds; suckers	birds use for cover	shrub to 15 feet	branching roots	moist-dry soil; sun-shade
Douglas spirea <i>Spiraea douglasii</i>	divisions; root cuttings, cuttings	birds and small mammals use for cover	dense shrub to 7 feet	extensive fibrous roots	wet sites, sun or shade
Indian Plum <i>Oemleria cerasiformis</i>	seed; cuttings	many wildlife species eat the fruit	sparse shrubs to 15 feet	shallow, spreading roots	moist dry soil; sun-shade

## RIPARIAN VEGETATION

<i>SHRUB SPECIES</i>	<i>METHOD OF PROPAGATION</i>	<i>HABITAT VALUE</i>	<i>FORM &amp; SIZE</i>	<i>ROOTING CHARACTER</i>	<i>CULTURE</i>
Mock Orange <i>Philadelphus lewisii</i>	cuttings; layers	deer browse foliage	shrub to 10 feet	fibrous roots	moist-dry soil; sun-shade
Oceanspray <i>Holodiscus discolor</i>	seed	deer browse foliage	shrub to 10 feet	shallow, spreading roots	moist-dry soil; sun-part shade
Pacific Ninebark <i>Physocarpus capitatus</i>	cuttings	birds use for cover	sparse shrub to 20 feet	shallow, lateral roots	moist-well drained soil; sun-shade
Red Elderberry <i>Sambucus racemosa</i>	cuttings from 2 <sup>nd</sup> year wood; root cuttings; seed	many bird species eat the berries and use branches for cover	shrub to 20 feet	fibrous, strong adventitious roots	moist-dry soil, sun-shade
Red-Osier Dogwood <i>Cornus stolonifera</i>	cuttings; layers	many birds eat the berries	shrub to 20 feet	spreads by shallow, strong rootstocks	wet-well drained soil, sun shade
Salmonberry <i>Rubus spectabilis</i>	cuttings, rooted cuttings	many bird species eat the berries	ground cover and shrubs to 10 feet	shallow, fibrous, trailing branches set roots	wet-dry soil; sun-shade
Serviceberry <i>Amelanchier alnifolia</i>	suckers; seedlings	many bird species eat the berries	shrub or small tree to 30 feet	deep, spreading roots	well drained-dry soil, sun
Sitka Alder <i>Alnus sinuata</i>	seedlings, cuttings	goldfinches eat the berries	shrub to 25 feet	shallow, extensive roots	moist soil; sun
Snowberry <i>Symphoricarpos albus</i>	suckers; cuttings	dense cover for birds and rodents	dense shrub to 3 feet;	extensive branching, fibrous roots;	moist-well drained soil; sun-shade
Tall Oregon Grape <i>Berberis aquifolium</i>	cuttings; layers	deer browse foliage	shrub to 7 feet	deep roots	well drained soil, sun-shade
Wild Rose <i>Rosa nutkana</i>	stem cuttings, root cuttings	provides good nest sites and food for birds	sparse to dense shrub to 4 feet	poor for erosion control	dry-moist soil; sun-partial shade
Willows <i>Salix spp.</i>	cuttings	rabbits and deer eat twigs, birds use for cover	shrubs or trees to 40 feet	shallow, extensive roots	moist-wet soils, sun

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## PLANTING PROCEDURES

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### PLANT MATERIALS

It is very important to choose plant materials that are specific to the planting site. Check with your county soil survey and your local NRCS/CONSERVATION DISTRICT office to determine the suitability of the site.

Native materials should always be used when planting streambanks. They have a lower mortality rate and require less maintenance than non-native species. Always avoid hot summer plantings, late fall through early spring is best.

There are four types of plant materials:

#### *Bare root plants*

Bare root plants are removed from the earth while still dormant in late fall or winter. These plants are generally about 2 years old. Nurseries grow bare root stock in the field or in a greenhouse. Nurseries designate where and for how long the stock was grown. The following is a list of that designation. These are in order of increasing cost and viability.

- 1-1 1 yr in greenhouse, 1 yr in field
- 2-0 2 yrs in greenhouse
- 2-1 2 yrs in greenhouse, 1 yr in field
- P-1 1 yr in container, 1 yr in field (Plug-1)

Bare root stock can be planted in late fall, early winter, or early spring which allows time for root recovery for spring growth. These are an

inexpensive form of nursery-bought material and commonly include deciduous trees and shrubs. Many Conservation Districts sell bare root stock in small or large quantities.

#### *Balled and burlapped plants (B&B)*

Balled and burlapped plants are dug with a ball of soil around the roots, which is wrapped in burlap or some other material. B&B plants may have a higher survival rate than bare root stock, but they are also more expensive. These must be planted before spring.

#### *Container plants*

Container plants are grown in containers rather than in the ground. They are usually small and expensive. Some deciduous plants which cannot be handled as bare root stock can be transplanted successfully from containers. These can be planted year round in some areas.

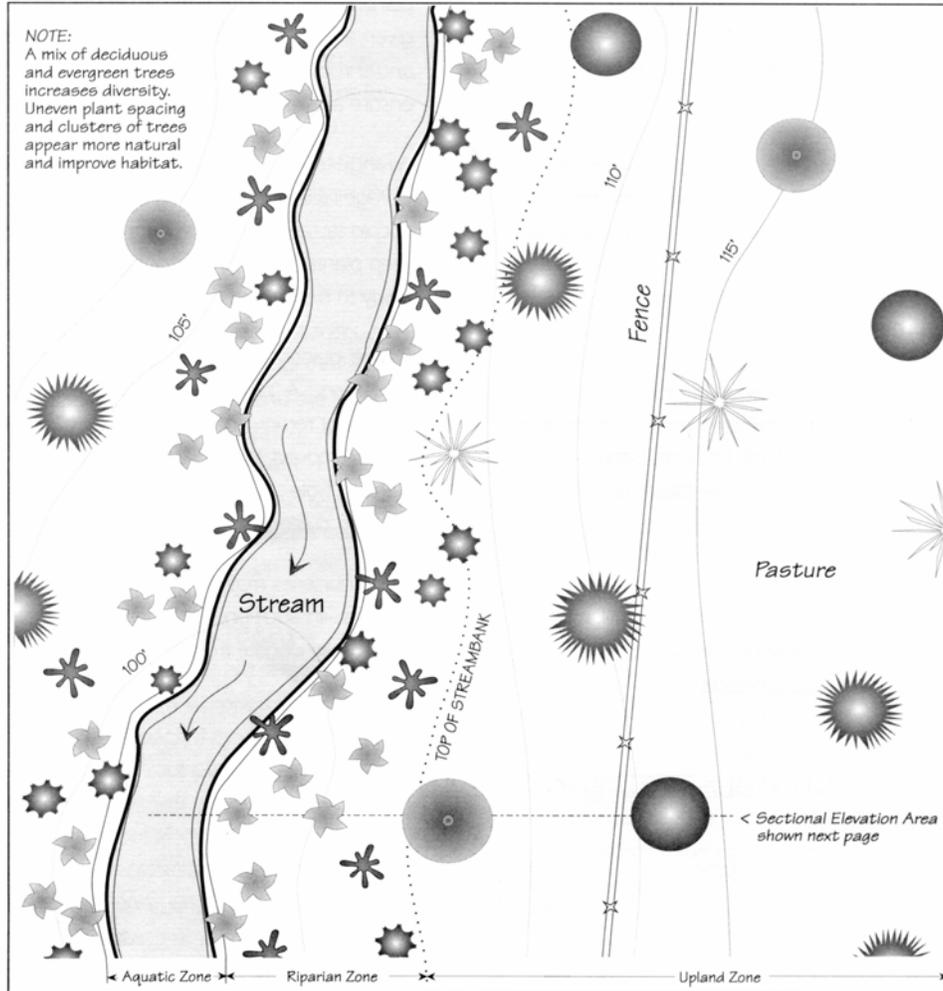
#### *Cuttings*

Cuttings are sections of branches taken from trees or shrubs such as willow or cottonwood. When planted in the ground, the cuttings sprout roots below the soil and shoots above the soil.

# PLANTING PROCEDURES

## PLANTING PLAN

A planting design provides a guideline for revegetation activities. The area designated for planting can be as large or small as the landowner chooses, given site constraints. The planting design will also depend on the landowner's goals for the property.



LEGEND: *Trees*                      *Shrubs*

- |  |   |
|--|---|
|  Cottonwood       |  Willow            |
|  Vine Maple       |  Red-osier Dogwood |
|  Douglas Fir      |  Oceanspray        |
|  Western Redcedar |   |



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## PLANTING PROCEDURES

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### TIPS FOR PLANTING DAY

There are several factors to consider when revegetating streams. These factors, highlighted below, are particularly important if trees and shrubs are planted in pasture zones where grass competes with trees for water and nutrition.



Art provided courtesy of the Puget Sound Water Quality Authority from *Puget Soundbook*.

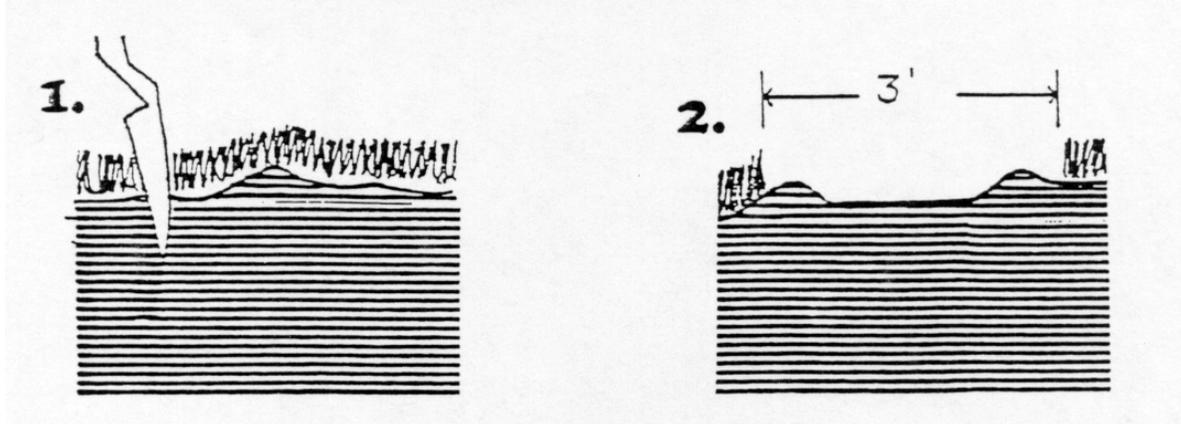
- \* It is important to select plant materials that is appropriate for the site. Use a soil survey and check with your local CONSERVATION DISTRICT for recommendations.
- \* Keep seedlings cool and moist before planting. Cold refrigeration between 34-36 degrees F is optimum.
- \* Planting during wet months increases the likelihood that roots will be moist during the initial growing period. Late February to Mid March is generally a good planting time, but local weather conditions should be considered.
- \* Keeping roots damp and covered before planting is **critical**. If roots are exposed to sun or wind, even for a few minutes, the tree can die. Keep plant materials in a burlap bag until the planting hole is dug. A good idea is to gently wrap moist saw dust around the roots before they are planted. Once the hole is dug, and the tree or shrub is placed in the hole, gently but quickly place loose soil over the roots.
- \* Planting trees on an overcast or rainy day can reduce the potential for the roots to dry. Watering the trees and shrubs after planting ensures that the roots remain moist by filling large air pockets which can dry the roots.
- \* Strategically place trees and shrubs. Willows should be planted as close to the stream as possible. Trees that will be large at maturity should not be planted right next to the stream. As they grow, their weight may topple them, disturbing the soil and de-stabilizing the streambank. Cedar and Hemlock must be planted in shady, wet areas.
- \* The width and length of the planting zone can be as wide and as long as the landowner prefers. If plantings become too dense in subsequent years, they can be thinned.
- \* Plant trees 10-12 feet apart, shrubs 5-8 feet, and willows 2 feet apart. This insures that they will not compete with each other as they get older
- \* Pasture sod should be removed in 3 foot diameter circles. This will reduce the competition from grass, which can grow as tall as 6 feet during the spring. Grass can shade seedlings and out-compete the trees and shrubs for precious water. Grass also provides habitat for rodents which eat the bark of the trees and shrubs resulting in severe damage or death of the tree.
- \* In very grassy sites where competition will be a problem, weed mats are extremely useful. These mats block sunlight to the weeds, but allow water to seep to the plants roots. They are also biodegradable.
- \* If animal browse will be a problem, (rodents/beaver/deer), biodegradable tree tubes are a must. They need to be placed around the tree immediately after planting. Waiting a week can mean life or death to your planting.
- \* Flag trees and shrubs after planting in order to locate them at a later date for maintenance.
- \* Fertilizing trees and shrubs is not necessary since native plants should not require additional nutrients. Also, fertilizer can encourage the growth of competing grasses and may pollute the stream if not applied correctly.

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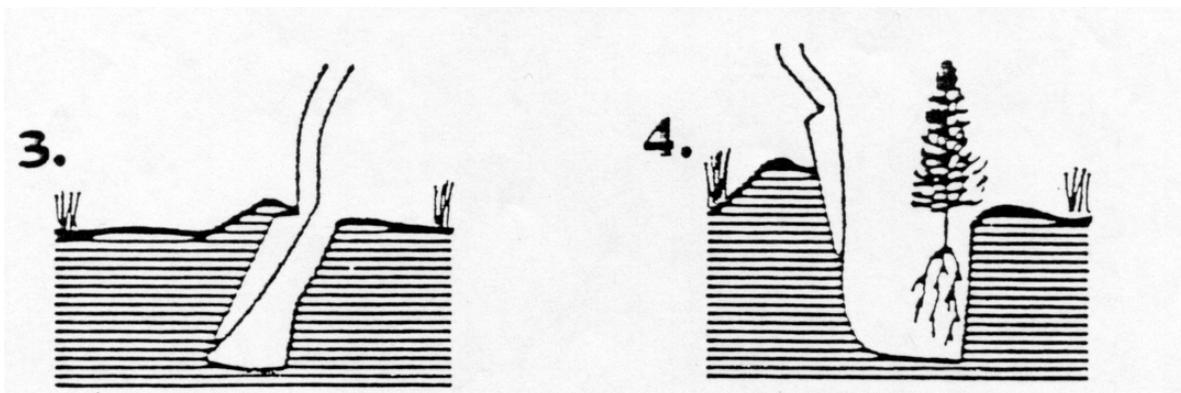
## PLANTING PROCEDURES

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Remember to keep the roots out of direct sunlight and wind until the trees and shrubs are ready to plant.

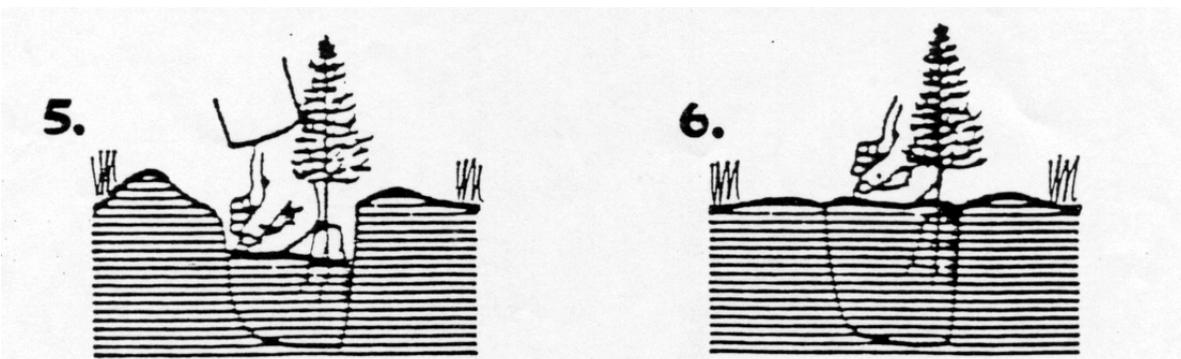


Remove or "scalp" sod with shovel at least **3 feet** in diameter.



3. Dig a hole that is slightly deeper than the root mass

4. Insert the tree at the proper planting depth; do not bend the roots.



5. Cover roots with loose soil, not clods. You can loosen soil with shovel

6. Compact soil at base of tree making sure tree is straight. Water the tree

# PLANTING PROCEDURES

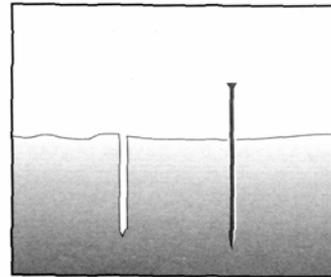
## PLANTING WILLOW CUTTINGS

Willow and Cottonwood cuttings should be planted using a metal planting bar (see diagram). The diameter of the planting bar should be **less than** the average diameter of the cutting to ensure firm contact between soil and the cutting.

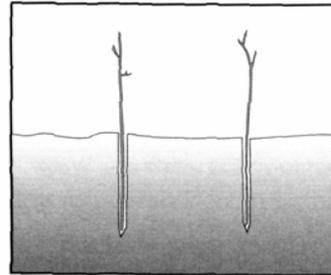
When planting, push the tool into the ground until it measures over one-half (1/2) the length of your cutting. Remove the planting bar, trying not to enlarge the hole by moving the planting tool back and forth. Buds pointed up, push the cutting into the ground until it touches the bottom of the hole.

A 36" cutting is preferred over a 12" cutting because it has a higher survival rate in areas with a lot of vegetative competition. Ideally, half of the cutting should be in the soil. Leave at least one healthy bud approximately 1 inch above the soil surface. The buds below ground will sprout roots, while the buds above ground will sprout branches.

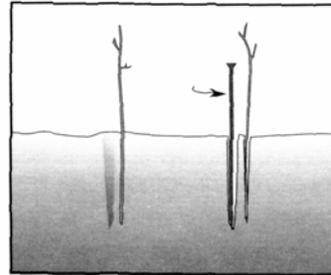
After the cutting is in the ground, place the planting bar into the soil adjacent to the cutting and move the bar toward the cutting to pack the soil around the base of the cutting to eliminate air pockets and insure contact with the moist soil.



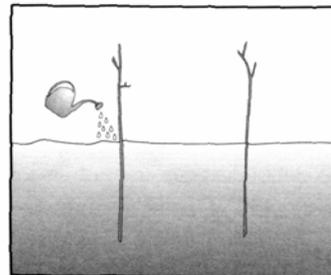
1. If soil is too hard for direct cutting placement, use a planting bar to create a hole. Make hole half the length of the cutting.



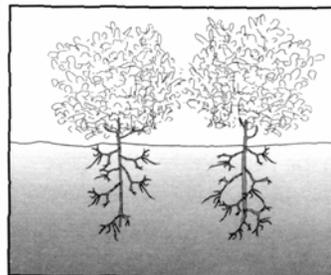
2. Insert willow cutting to the bottom of hole.



3. Re-insert the planting bar adjacent to first hole and move bar toward willow cutting to close hole.



4. Water thoroughly.



5. Watch your willows grow and flourish.

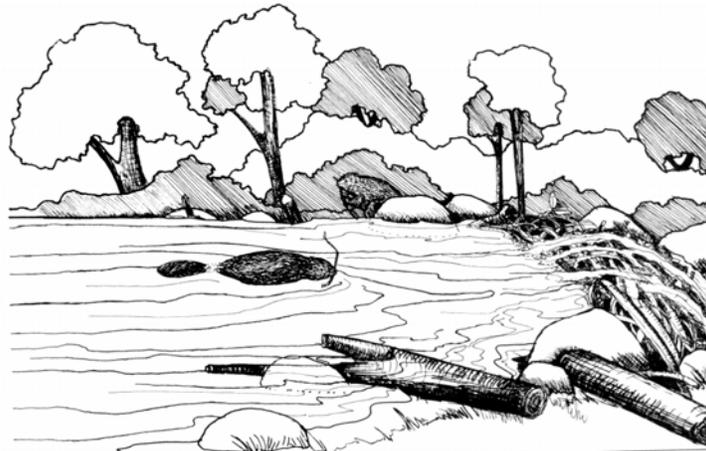
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## MAINTENANCE PROCEDURES

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During the first three years of growth, young trees and shrubs are very susceptible to drought, competition for light and nutrients, and browsing by livestock and wildlife. To increase survival of your plantings, it is important that they receive special attention during this early growing period. The following procedures may increase the survival of young trees and shrubs:

- \* The planted material should be inspected every month during the first year and quarterly during the next two years to see if there is any damage to the trees and shrubs to determine what action should be taken to deter further damage.
- \* If rodents become a problem, wrap aluminum foil around the base of the tree. Check periodically for molding and retention of water in between the bark and foil.
- \* If deer and elk pose a problem, biodegradable plastic tubes or netting are available at forestry supply stores.
- \* Fence livestock from the planting site. Alternative watering sources can be developed away from the stream to provide water to the animals.
- \* Drought is hazardous to young seedlings. Water deeply every 2-3 weeks if drought persists during the first year.
- \* If planting is done in a pasture, the grass should be periodically removed around each tree and shrub to maintain the original 3 foot diameter sod cut. Grass should be removed once in spring and once in fall during the first three years to reduce grass competition.
- \* Beaver can extensively harvest willow cuttings and cottonwood seedlings and may have to be relocated. Wildlife agencies should be contacted for assistance and recommendations.



Art provided courtesy of the Adopt a Stream Foundation from *Adopting A Stream: A Northwest Handbook*

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## WAYS TO IMPROVE WATERSHEDS

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In many watersheds throughout the Pacific Northwest residents have begun to improve riparian zones and water quality. Residents can become involved in organizations such as Conservation Districts, Adopt-A-Stream Foundation, watershed advisory committees, and local clubs that participate in creek cleanup programs. Many committees and projects are already in existence in your local area.

There are many things individuals can do to enhance riparian zones and improve water quality, such as:

- \* Protect trees adjacent to streams and plant trees wherever possible, particularly near streams.
- \* Control livestock access to streams. Animal waste degrades water quality and hooves de-stabilize streambanks.
- \* Refrain from grazing livestock during the wet winter months. Soil is particularly susceptible to compaction when wet. Compacted soils facilitate surface runoff and erosion.
- \* Refrain from vehicle activity near streams. Vehicles can break down streambanks and allow sediment to enter the water.
- \* Check septic systems every 3-5 years to ensure their capacity is adequate. Refrain from flushing caustic chemicals, chlorine bleach, oil, and plastic down the toilet, as these compounds severely impair septic systems.
- \* Use non-phosphate detergents. Detergents containing phosphates enter waterways and increase the growth of algae, resulting in reduced oxygen levels in the water which can seriously impact other aquatic life.
- \* Reduce the use of lawn and garden pesticides or fertilizers.



Art provided courtesy of the Adopt a Stream Foundation from *Adopting A Stream: A Northwest Handbook*

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## ADDITIONAL ASSISTANCE

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Riparian plantings can be complex and usually require the assistance of trained personnel. It is important to receive input from biologists, engineers, landscape architects and planners before, during, and after the project is complete. Permits are required to work near streams. The following agencies can provide assistance.

### CONSERVATION DISTRICTS

Districts are non-regulatory and found in nearly every county in Oregon and Washington. CONSERVATION DISTRICT boards of supervisors are comprised of local landowners. District employees specialize in conservation practices.

State Office Phone: (360) 407-6215  
Website: [www.conserver.org](http://www.conserver.org)

### USDA Natural Resources Conservation Service (NRCS)

This non-regulatory agency has over 50 years of experience working with citizens to address soil and water conservation concerns.

State Office Phone: (509) 323-2900  
Website: [www.nrcs.usda.gov](http://www.nrcs.usda.gov)

### USDA Farm Services Agency (FSA)

The FSA can provide cost-share assistance to landowners for riparian enhancement.

State Office Phone: (509) 323-3000  
Website: [www.fsa.usda.gov](http://www.fsa.usda.gov)

### State and Federal Fish and Wildlife Agencies

Fish and wildlife personnel commonly specialize in fish and wildlife enhancement. These agencies are very familiar with the permit requirements for riparian restoration

projects. They also have permitting authority.

State Agency Phone: (360) 902-2225  
Website: [www.wa.gov/wdfw](http://www.wa.gov/wdfw)

Fed Agency Phone: (360) 753-9440  
Website: [www.fws.gov](http://www.fws.gov)

County Planning Departments  
County planning departments provide information pertaining to permit requirements.

State Department of Ecology/Environmental Quality  
These agencies have considerable information on water quality enhancement and periodically fund riparian restoration projects.

State office Phone: (360) 407-6300  
Website: [www.wa.gov/ecology](http://www.wa.gov/ecology)

### State Department of Natural Resources

This agency has extensive experience with riparian zone management in forestlands and can provide assistance to landowners.

State Office Phone: (360) 902-1004  
Website: [www.wa.gov/dnr](http://www.wa.gov/dnr)

### U.S Environmental Protection Agency

This regulatory agency has information on stream enhancement and permitting authority for wetlands and waterways.

Phone: 1-800-424-4EPA  
Website: [www.epa.gov/region10](http://www.epa.gov/region10)

### Adopt-A-Stream Foundation

This organization provides information to those interested in adopting a stream. The Adopt-A-Stream Foundation often works with teachers and students in local school districts.

Phone: (425) 316-8592  
Website: [www.streamkeeper.org](http://www.streamkeeper.org)

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## WASHINGTON STATE CONSERVATION DISTRICTS

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**Adams CD**

402 East Main  
Ritzville, WA 99169  
Phone: (509) 659-1553

**Asotin County CD**

720 6<sup>th</sup> Street, Suite B  
Clarkston, WA 99403  
Phone: (509) 758-8012

**Benton CD**

24106 North Bunn Road  
Prosser, WA 99350  
Phone: (509) 786-9230

**Central/Eastern Klickitat  
CD**

1107 South Columbus Avenue  
Goldendale, WA 98620  
Phone: (509) 773-5823

**Chelan County CD**

301 Yakima Street, Room 307  
Wenatchee, WA 98801  
Phone: (509) 664-0265

**Clallam CD**

111 East 3<sup>rd</sup>, Room 2A  
Port Angeles, WA 98632  
(360) 452-1912

**Clark CD**

11104 NE 149<sup>th</sup> Street  
Building C, Suite 400  
Brush Prairie, WA 98606  
Phone: (360) 883-1987

**Columbia CD**

202 South Second Street  
Dayton, WA 99328  
Phone: (509) 382-4773

**Cowlitz CD**

2125 8<sup>th</sup> Avenue  
Longview, WA 98632  
Phone: (360) 425-1880

**Ferry CD**

84 East Delaware Avenue  
PO Box 1045  
Republic, WA 99166  
Phone: (509) 775-3473

**Foster Creek CD**

103 North Baker Street  
PO Box 428  
Waterville, WA 98858  
Phone: (509) 745-8362

**Franklin CD**

1620 Road 44N  
Pasco, WA 99301  
Phone: (509) 545-8546

**Grays Harbor CD**

330 Pioneer Avenue West  
Montesano, WA 98563  
Phone: (360) 249-5980

**Jefferson County CD**

205 West Patison Street  
Port Hadlock, WA 98339  
(360) 385-4105

**King CD**

935 Powell Avenue SW  
Renton, WA 98055  
Phone: (206) 764-3410

**Kitsap CD**

817 Sidney Avenue  
Port Orchard, WA 98366  
Phone: (360) 337-7171

**Kittitas County CD**

607 East Mountain View Ave  
Ellensburg, WA 98926  
Phone: (509) 925-8585

**Lewis County CD**

1554 Bishop Road  
Chehalis, WA 98532  
Phone: (360) 748-0083

**Lincoln County CD**

1310 Morgan Street  
PO Box 46  
Davenport, WA 99122  
Phone: (509) 725-4181

**Mason CD**

SE 1051 HWY 3, Suite G  
Shelton, WA 98584  
Phone: (360) 427-9436

**Moses Lake CD**

1775 SE Hwy 17  
Moses Lake, WA 98837  
Phone: (509) 765-5333

**North Yakima CD**

1606 Perry Street, Suite F  
Yakima, WA 98902  
Phone: (509) 454-5736

**Okanogan CD**

1251 South 2<sup>nd</sup> Avenue,  
Room 101  
Okanogan, WA 98840  
Phone: (509) 422-0855

**Othello CD**

449 East Cedar Blvd  
Othello, WA 99344  
Phone: (509) 488-2802

**Pacific CD**

1216 Robert Bush Drive  
PO Box 968  
South Bend, WA 98586  
Phone: (360) 875-9424

**Palouse CD**

325 NW State Street  
Pullman, WA 99163  
Phone: (509) 332-4101

**Palouse-Rock Lake CD**

North 3 Front Street  
PO Box 438  
St. John, WA 99171  
Phone: (509) 648-3680

**Pend Oreille CD**

100 North Washington Ave  
PO Box 280  
Newport, WA 99156  
Phone: (509) 447-5370

**Pierce CD**

1011 East Main, Suite 106  
Puyallup, WA 98372  
Phone: (253) 845-9770

**Pine Creek CD**

805 South Vista Point Drive,  
Suite 2  
Colfax, WA 99111  
Phone: (509) 397-4636

**Pomeroy CD**

804 Main Street – PO Box 468  
Pomeroy, WA 99347  
Phone: (509) 843-1998

**San Juan County CD**

350 Court Street, #10  
Friday Harbor, WA 98250  
Phone: (360) 378-6621

# WASHINGTON STATE CONSERVATION DISTRICTS

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## **Skagit CD**

2021 East College Way,  
Suite 203  
Mt. Vernon, WA 98273  
Phone: (360) 428-4313

## **Snohomish CD**

528-91<sup>st</sup> Avenue NE, Suite C  
Everett, WA 98205  
Phone: (425) 335-5634

## **South Douglas CD**

103 North Baker Street  
PO Box 246  
Waterville, WA 98858  
Phone: (509) 745-9160

## **South Yakima CD**

1116 Yakima Valley Hwy  
Sunnyside, WA 98944  
Phone: (509) 837-7911

## **Spokane County CD**

210 North Havana  
Spokane, WA 99202  
Phone: (509) 535-7274

## **Stevens County CD**

232 Williams Lake Road  
Colville, WA 99114  
Phone: (509) 685-0937

## **Thurston CD**

2400 Bristol Court SW,  
Suite 100  
Olympia, WA 98502  
Phone: (360) 754-3588

## **Underwood CD**

170 NW Lincoln Street  
PO Box 96  
White Salmon, WA 98672  
Phone: (509) 493-1936

## **Upper Grant CD**

2145 Basin Street SW,  
Suite C  
Ephrata, WA 98823  
Phone: (509) 754-2463

## **Wahkiakum CD**

PO Box 67  
Cathlamet, WA 98612  
Phone: (360) 795-8240

## **Walla Walla CD**

1501 Business One Circle,  
Suite 101  
Walla Walla, WA 99632  
Phone: (509) 522-6340

## **Warden CD**

PO Box 177  
Warden, WA 98857  
Phone: (509) 349-7539

## **Whatcom CD**

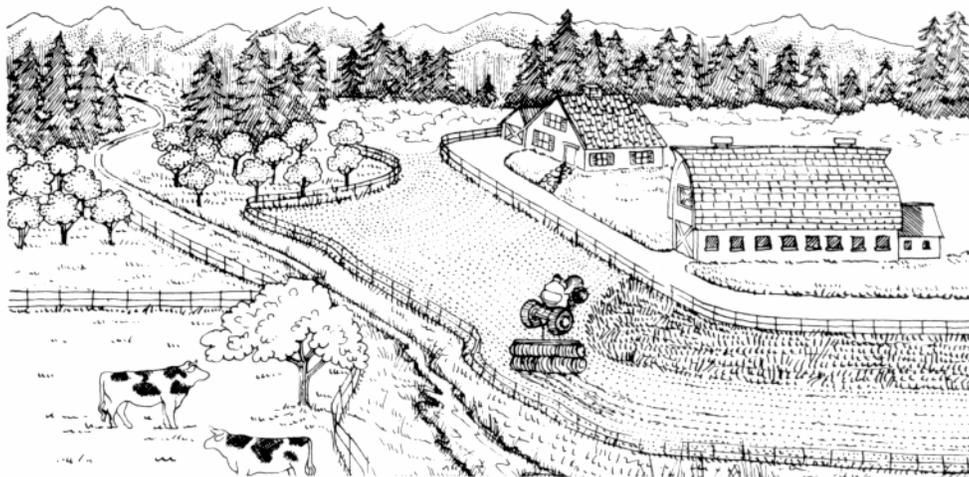
6975 Hannegan Road  
Lynden, WA 98264  
Phone: (360) 354-2035

## **Whidbey Island CD**

PO Box 49  
Coupeville, WA 98239  
Phone: (360) 678-4708

## **Whitman CD**

805 South Vista Point Drive,  
Suite 2  
Colfax, WA 99111  
Phone: (509) 397-4636



Art provided courtesy of the Adopt a Stream Foundation from *Adopting A Stream: A Northwest Handbook*

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