

Streamside Planting and Maintenance Workbook

Creating a healthy and beautiful streamside for all



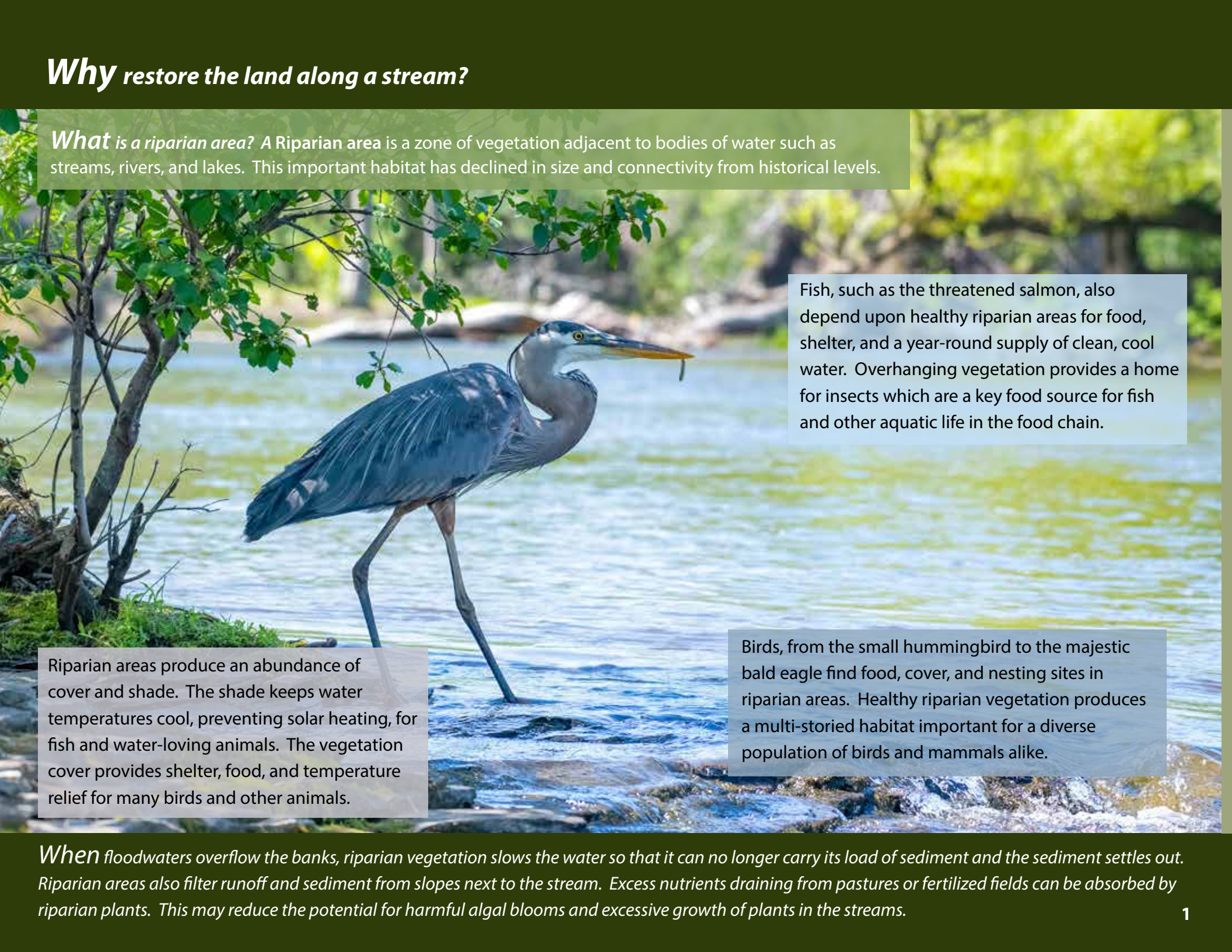
CLACKAMAS SOIL AND WATER

**CONSERVATION
DISTRICT**

Good dirt. Clean water.

Why restore the land along a stream?

What is a riparian area? A Riparian area is a zone of vegetation adjacent to bodies of water such as streams, rivers, and lakes. This important habitat has declined in size and connectivity from historical levels.



Fish, such as the threatened salmon, also 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.

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

Birds, from the small hummingbird to the majestic bald eagle find food, cover, and nesting sites in riparian areas. Healthy riparian vegetation produces a multi-storied habitat important for a diverse population of birds and mammals alike.

When floodwaters overflow the banks, riparian vegetation slows the water 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 growth of plants in the streams.

What should I consider before restoring my streamside?

Site Conditions

What kind of soil do you have?

Soils with a high percentage of sand do not hold water like clay/loamy soils. Other soils may be too wet to support certain types of vegetation, such as hydric soil. This soil is permanently or seasonally water-logged, such as found in wetlands. Only wet-loving plants such as willows, red-osier dogwood, Douglas spirea, etc., will survive in these areas.

If there is a restrictive layer in your soil that does not allow roots or water to pass through, trees with shallow roots such as big leaf maple, dogwood, cherry, etc. should be used. Avoid using trees with deep roots such as conifers, oaks, and cottonwood.

Find your soil type and other information using the **Web Soil Survey**.

<https://websoilsurvey.nrcs.usda.gov/app>

Know what type of soil you have on site before selecting the plants for your project.

What type of soil do you have?	
Do you have clay, silt, or sand dominated soils?	
Do you have hydric soils?	
What is your soil drainage?	
Do you have a soil restrictive layer?	



Where is the sun?

It is important to consider how much shade and sun there is in a planting site before choosing the trees and shrubs for your project. The direction each streambank is facing will influence the conditions for the plants.

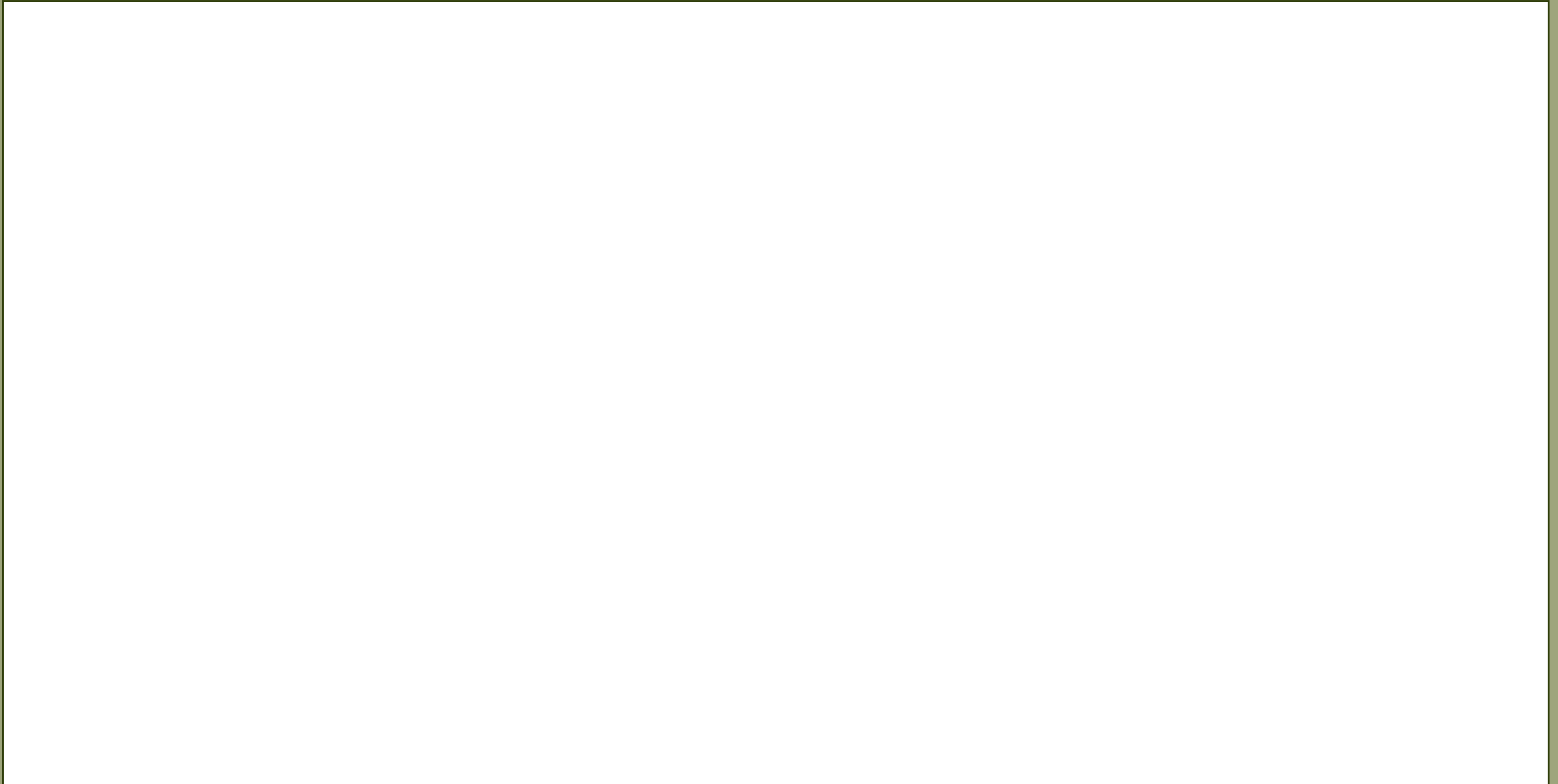
In Oregon, west and south facing slopes receive the most sunlight.

What should I consider before restoring my streamside?

My Property Map

Draw your property and riparian area here!

Consider marking: erosion and steep banks, soils, current invasive and native vegetation, and known wildlife spots. Add a north arrow!



Apply technology to your project. Consider using the landmapper tool by Ecotrust to create free maps of your property:
<https://landmapper.ecotrust.org/landmapper>

What should I consider before restoring my streamside?

Invasive Weeds

Just like the name says, invasive species invade. These plants outcompete important native plants. This prevents our native wildlife from living along the riparian area and causes gaps in habitat. Invasive weeds do not provide good bank stabilization due to their shallow roots and many weeds are highly flammable.

You will need to control the invasive weeds before you plant your streamside. See the site preparation section in this document.

Below are some common invasive weeds found in riparian areas.



English hawthorn



English holly



English ivy



Himalayan blackberry



Japanese knotweed



Old man's beard



Reed canarygrass



Sweet cherry

Make a list of the weeds you find:

What invasive weeds do you have on your property? If you find a plant you cannot identify, there are resources to help. Use the iNaturalist app on your cell phone. <https://www.inaturalist.org/> Also see the WeedWise website <https://weedwise.conservationdistrict.org/> or check the resource section at the end of this document.

What should I consider before restoring my streamside?

Native Plants

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. 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. Native plants currently growing on the property are the best way to determine what to plant and what kind of site conditions are present.



Red alder



Western red cedar



Black cottonwood



Red-osier dogwood



Bigleaf maple



Tall Oregon grape



Indian plum



Pacific willow

Take an inventory of the native plants on your site.

DO you have a plant you cannot identify? Good news! iNaturalist not only identifies invasive plants, but will also help identify native plants and insects! Use the iNaturalist app on your cell phone. <https://www.inaturalist.org/> Another resource is the OregonFlora website <https://oregonflora.org/>

What should I consider before restoring my streamside?

Site Preparation

Just like it sounds, invasive weeds invade an area and outcompete beneficial native plants. This prevents many wildlife species from living in the riparian area and causes gaps in the habitat. Invasive weeds often do not provide good bank stabilization. In many cases, their roots are shallow compared to the deeper roots of native plants. In addition, many invasive weeds are highly flammable.

You will need to control the invasive weeds before you plant your streamside.

Below are some of the most common invasive weeds found in the riparian area and methods to control them.

Common Name/ Scientific Name		Control Methods	Reformatted information from Integrated Weed Maintenance, Fall 2020 4-County Cooperative Weed Management Area		
Old man's beard/ <i>Clematis vitalba</i>	Life Cycle	March thru June - leaves emerge	July - flowers	August - seeds	
	Manual or Mechanical	April thru July - handpull seedlings			
	Chemical	July thru October - 4% glyphosate + 2% triclopyr (follow w/ 50% glyphosate cut stump)			
English hawthorn/ <i>Crataegus monogyna</i>	Life Cycle	March - leaves emerge	April - flowers	May - fruit	June thru October - leaves
	Manual or Mechanical	December thru June - weed wrench smaller stems (<2" diameter) while soil is moist. Will require regular followup.			
	Chemical	June thru March - Cut stump and treat w/ 50% triclopyr (girdling not effective)			
English ivy/ <i>Hedera helix</i>	Life Cycle	Leaves are evergreen	September thru November - flowers	December thru February - fruit	
	Manual or Mechanical	December thru June - cut/dig - effective when soil is moist			
	Chemical	July thru October - 4% glyphosate + 2% triclopyr (follow w/ 50% glyphosate treatment on cut stump)			

Continued on next page

Suggested rates are generalized by active ingredient. Specific rates will vary between products. Be sure to review the label before application and use the recommended label rate at all times. The label is the law!

What should I consider before restoring my streamside?

Common Name/ Scientific Name		Control Methods	Reformatted information from Integrated Weed Maintenance, Fall 2020 4-County Cooperative Weed Management Area			
English holly/ <i>Ilex aquifolium</i>	Life Cycle	Leaves are evergreen	May thru June - flowers	July thru November - fruit		
	Manual or Mechanical	December thru June - weed wrench small patches while soil is moist. Will require regular followup.				
	Chemical	June thru January - cut stump and treat w/ 50% triclopyr or glyphosate				
Reed canarygrass/ <i>Phalaris arundinacea</i>	Life Cycle	March thru May - leaves emerge	June - flowers	July - seeds	August thru October - leaves	
	Manual or Mechanical	July - mow/flail instead of first spray				
	Chemical	March thru April - 2% glyphosate on new growth / August thru September - same (follow up, esp.to mow/flail)				
Japanese knotweed/ <i>Polygonum cuspidatum</i>	Life Cycle	April - plants emerge	May thru June - rapid growth	July thru August- flowers	September thru October - seed	Nov. - die back
	Manual or Mechanical	July - cut to prepare for spray Cutting stimulates growth, do not cut unless you plan to spray afterwards.				
	Chemical	August thru October - spray when about 3' tall: 2% glyphosate, 2% triclopyr, or 1% imazapyr (especially on yellow leaves)				
Sweet cherry/ <i>Prunus avium</i>	Life Cycle	April - flower	May - leaves emerge	June - fruit	July thru October - leaves	
	Manual or Mechanical	December thru June - weed wrench while soil is moist. Will require regular followup				
	Chemical	June thru March - cut stump and treat with 50% triclopyr				
Himalayan blackberry/ <i>Rubus armeniacus</i>	Life Cycle	April thru May - leaves emerge	June - flower	Jul thru August - fruit	September - leaf die-back	
	Manual or Mechanical	April - cut	May thru July- use care cutting during nesting season		August - cut	
	Chemical	July thru September - treat with 2% triclopyr				

Suggested rates are generalized by active ingredient. Specific rates will vary between products. Be sure to review the label before application and use the recommended label rate at all times. The label is the law!

What should I consider before restoring my streamside?

Safe Chemical Control - The Label is the Law!

Before purchasing any herbicide product, it is important to read the label. **The label is the Law.** Carefully review all parts of the label even if you have used the product before. Select a product that is most appropriate for your site. If you have questions, ask your vendor before purchasing a product.

When selecting herbicides, always use a product appropriately labeled for your site. Follow label recommendations and restrictions at all times. If any information provided here contradicts the label, **use the information on the label.**

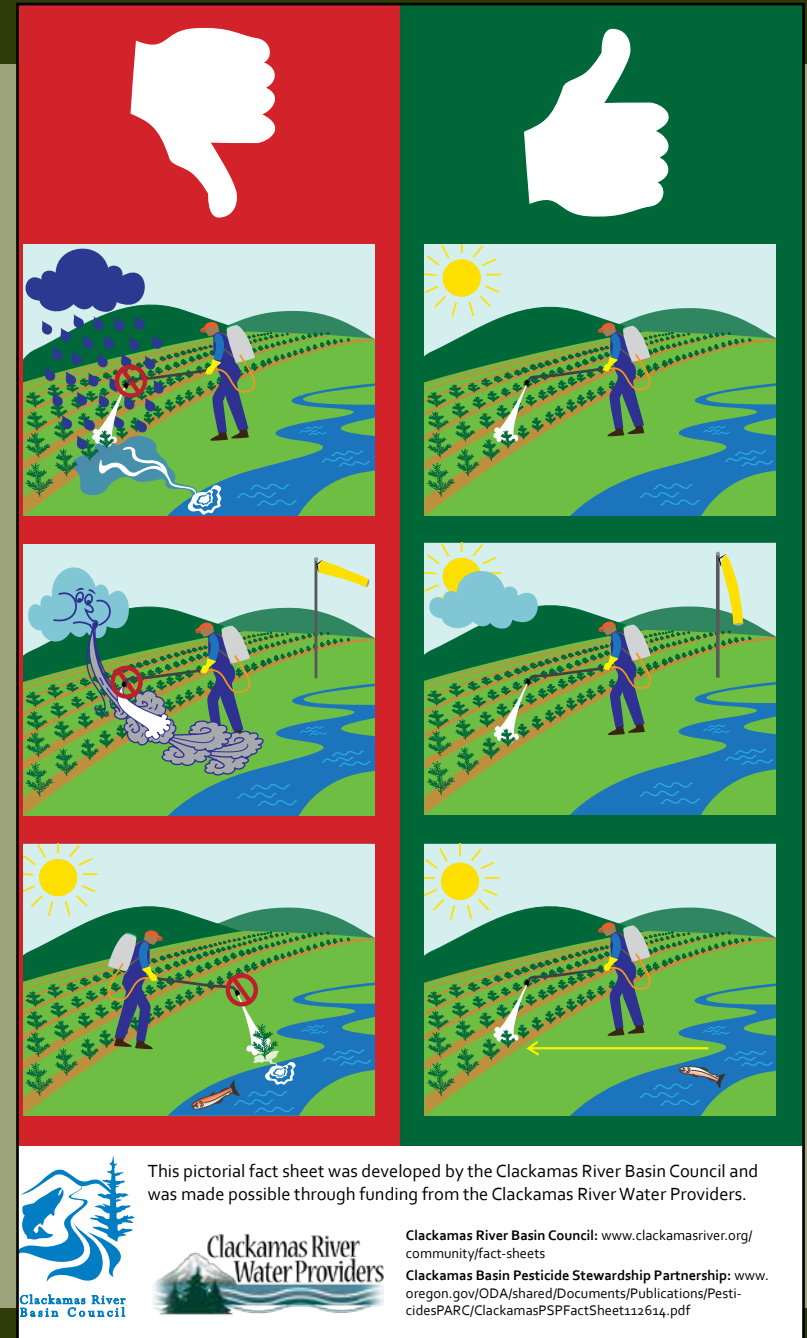
Chemical products for invasive weed control (herbicides) used in a streamside area should be specifically labeled for aquatic use. Be sure to read the label to see how close to the water you can spray. Use spot spray techniques whenever possible to avoid harming non-target plants.

When using herbicides, it is recommended to add an adjuvant or surfactant. This allows the chemical to “stick” to the leaves resulting in a more effective treatment.

To make others aware that an area has been treated, consider using a brightly colored dye to show where you have sprayed. This is also useful for the applicator so they can keep track of the area already sprayed and what is left.

Watch the weather conditions before spraying. Weeds may be sprayed if there is a breeze up to 6 mph, but only if the wind is blowing AWAY from the water. Also, read the label to know how long it takes the herbicide to dry before any rain falls on the area.

Protect yourself. Always wear the recommended protective clothing identified on the label. Be sure to store any chemicals out of the reach of children and pets to keep your family safe.



What should I consider before restoring my streamside?

Watch Out For The Birds...And The Bees!

To protect nesting birds, consider avoiding activities between April 15 and July 31. This is the primary bird nesting season in Oregon. If you cannot avoid activity during this period, consider surveying for active nests and allowing a buffer around the nest to protect young birds.

Another consideration is the protection of pollinators. If invasive weeds are flowering or there are other flowering native plants in the area, spray early in the morning or late in the afternoon when bees or other pollinators are less active.

Herbicide labels and formulations change regularly. Check the Pacific Northwest Weed Management Handbook and the product label for current control recommendations.



The mention of any brand name product is not and should not be construed as an endorsement of that product. They are included here only for educational purposes.

Suggested rates are generalized by active ingredients. Specific rates will vary between products. Be sure to review the label before application and use the recommended label rate at all times.



The Pacific Northwest Weed Management Handbook is a quick and ready reference for weed control practices and herbicides used in various cropping systems or sites in Idaho, Oregon, and Washington. <https://pnwhandbooks.org/weed>

A Calendar for Success - Site Preparation - March thru November

Invasive Weed Calendar

From March through November track your invasive weed control activities.

Year 1

Completed?	Invasive Weed	Treatment	Timeline	Notes

Year 2

Completed?	Invasive Weed	Treatment	Timeline	Notes

Livestock Care

A New Place To Drink!

Livestock should not have access to the stream or planting area. Animal waste degrades water quality and hooves destabilize banks and trample newly planted trees and shrubs.

Fencing and an alternative water source should be part of your project to give your animals safe drinking water and to protect water quality.

When Selecting a Fence Consider:

- The purpose (type of animal you're keeping in or out)
- Type of soil material (rocky or deep loam)
- Terrain
- Material and labor costs for construction
- Availability of power
- Maintenance requirements
- Weather
- Visual impact
- Wildlife

Smooth wire is safer for wildlife than barbed or woven wire. Space wires at 16", 22", 28", and 40" from the ground to allow antelope, deer, and elk to get through with reduced fence damage.

The 12" gap between the top two wires keeps animals from getting tangled in the wires.

From Tips on Land & Water Management for Small Acreages in Oregon



To read more about managing small acreage farms with local conditions, see Tips on Land & Water Management for Small Acreages in Oregon. Go to https://conservationdistrict.org/?wpfb_dl=904.

Planting Design

Design Your Project

Stream Buffer Size

The recommended width of your project buffering the stream depends on your restoration goal.

- If water quality is of concern, then a minimum of 35 feet is effective.
- If erosion is the goal, then a minimum of 35 feet is recommended for small streams but for larger streams and rivers, consider increasing the buffer to 30% of the floodplain width.
- If cooler water temperatures for fish are the priority, then a buffer of 100 feet or more is recommended. According to the US Forest Service, riparian buffers of 100 feet or more have been reported to provide as much shade as an old-growth forest.
- If creating habitat is the goal, the recommendation of the Oregon Department of Fish and Wildlife is that in general the area within 600 feet of a stream is used most heavily by wildlife. However, the wider the buffer, the better!

A good rule of thumb is to take the width of the channel and replicate it on both sides of the creek. Wider creeks/rivers will need wider riparian areas.

Once you determine your stream buffer it is helpful to mark the edges using pin flags or T-posts. This will remind anyone working in the area to avoid where you have placed all your restoration efforts.

Plants Per Acre

The number of plants per acre depends on what already exists on the site and how many plants you are willing to purchase.

In general, consider 1500-2000 trees and shrubs per acre. Riparian areas are generally 80% shrubs and 20% trees.



YOU can use applications such as Google Earth to help determine your stream buffer boundaries when planning your project. Google Earth may be used in a browser without having to download. Go to [google.com/earth](https://www.google.com/earth).

A Calendar for Success - Planting - December thru March

Plant Selection

What is Best For You? Bare Root Plants, Cuttings, or Potted Plants?

Bare root stock can be planted in late fall, early winter, or early spring which allows for root recovery before spring growth. Bare root plants 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.

Cuttings are stems from certain dormant trees or shrubs that root easily and grow quickly. Cuttings also have a narrow planting window and must be in the ground before the buds break. Willows and dogwood are the most common cuttings available. This is also more economical to purchase than potted plants.

Potted plants come planted in pots. They tend to cost more than bare root plants and are harder to transplant but may be planted a little later in the season.

Seed Zones

Another important thing to consider when ordering plants is the original area where the seed was collected. Oregon has a vast area of different climates and elevations. A Douglas-fir from the Willamette Valley might have evolved differently than a Douglas-fir from the coast, even though they are the same species. Therefore, seed zones were established to enable successful plantings.

Order trees and shrubs for the correct Willamette Valley seed zone, ZONE 8, and the appropriate elevation that matches your site as closely as possible.

*Order plants in the summer.



Ash Alert!

You may have heard about the Emerald Ash Borer. It is an invasive beetle that will kill the ash trees in our state.

While Oregon ash has been a commonly used tree in riparian plantings, we recommend avoiding them in your project.

New information continues to be published. Check with [Oregon Department of Agriculture](#) for the latest on Emerald Ash Borer.

Be alert! It is important to stop new outbreaks before they spread. Early detection, coupled with rapid response, can stop the spread of new and emerging invasive species before they become established.

Native plant material is recommended when planting streambanks. These plants generally have a lower mortality rate and require less maintenance than non-native species. Always avoid hot summer plantings. Late fall through early spring is the best time to plant.

A Calendar for Success - Planting - November thru March

Riparian Planting Zones

Bank Zone

- Shrubby, flexible shrubs
- Plants that can handle long periods of flooding, standing water
- Examples: willows, dogwood

Overbank Zone

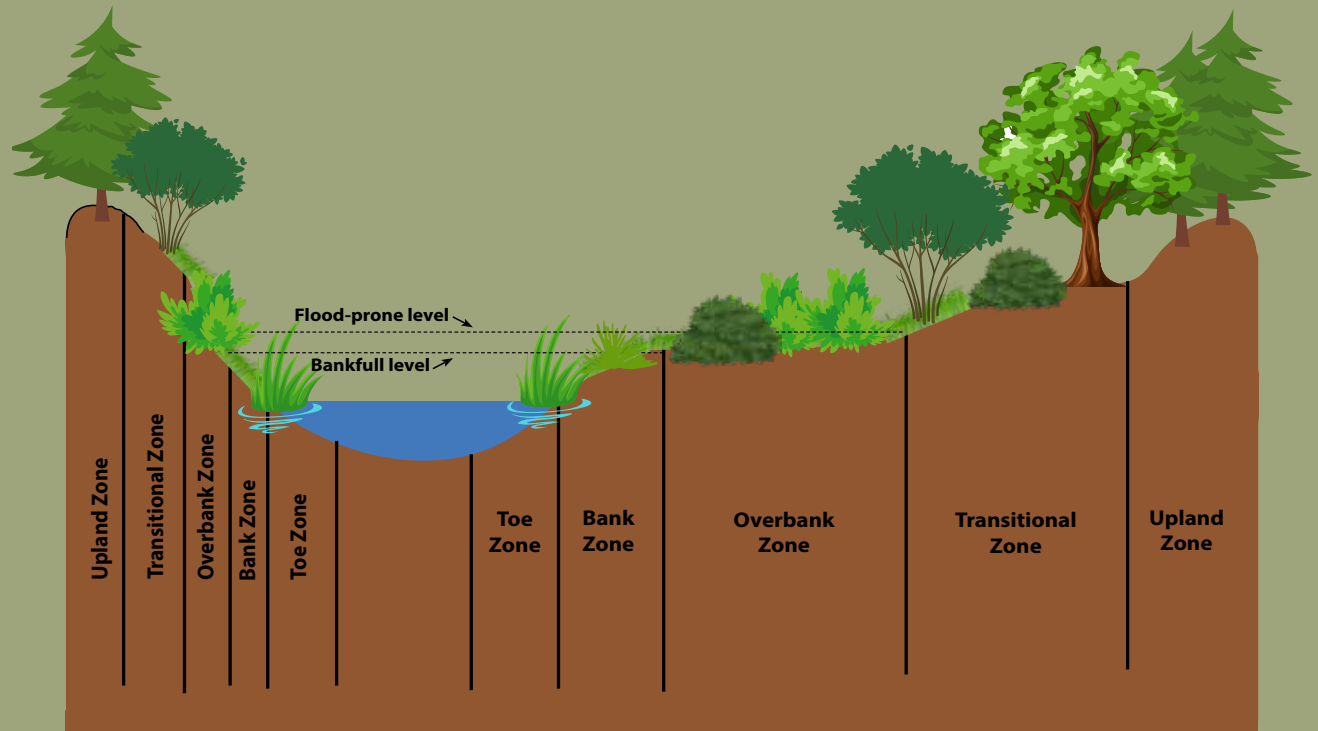
- Generally flat and sporadically flooded about every 2 – 5 years
- Similar to Bank Zone vegetation (willows, dogwoods, etc.)

Transitional Zone

- May have a flood every 50 years or so
- Zone where larger trees are typically found, (black cottonwood, red alder, etc.)

Upland Zone

- Trees and shrubs that can be expected to thrive without any access to groundwater from stream/river



Not all streams will have all riparian planting zones present. Refer to the drawing to help you determine where to plant riparian species in relation to the water line.

Look at your planting area. In what zones do your planting sites fall? This makes it easier to choose the correct plants for your zones!

A Calendar for Success - Planting - November thru March

SPECIES	GROWING CONDITIONS	PREFERRED STOCK TYPE	QUANTITY	RIPARIAN PLANTING ZONES			
				Bank	Overbank	Transition	Upland
Bigleaf maple (<i>Acer macrophyllum</i>)	moist - dry soil full sun-part shade	Bareroot				X	X
Black cottonwood (<i>Populus trichocarpa</i>)	moist - wet soil full sun - part shade	Bareroot or Cutting			X	X	
Douglas-fir (<i>Pseudotsuga menziesii</i>)	moist - dry soil full sun - part shade	Bareroot or Plug				X	X
Oregon white oak (<i>Quercus garryana</i>)	moist -dry soils, can tolerate wet soils needs more distance from other plants full sun	Bareroot				X	X
Red alder (<i>Alnus rubra</i>) White Alder (<i>Alnus rhombifolia</i>)	moist soil full sun - part shade	Bareroot			X	X	X
Western crabapple (<i>Malus fusca</i>)	moist - wet soils full sun - part shade	Bareroot		X	X	X	

A Calendar for Success - Planting - November thru March

SPECIES	GROWING CONDITIONS	PREFERRED STOCK TYPE	QUANTITY	RIPARIAN PLANTING ZONES			
				Bank	Overbank	Transition	Upland
Western red cedar (<i>Thuja plicata</i>)	moist - wet soil part shade - shade	Bareroot or Plug				X	X
Willamette Valley Ponderosa Pine (<i>Pinus ponderosa - Willamette</i>)	dry soils but can tolerate moist soils full sun	Bareroot or Plug				X	X
SHRUBS							
Black hawthorn (<i>Crataegus douglasii</i>)	moist - dry soil full sun - part shade	Bareroot			X	X	
Black twinberry (<i>Lonicera involucrata</i>)	wet - moist soil full sun - part shade	Bareroot		X	X	X	
Blue elderberry (<i>Sambucus cerulea</i>)	moist - dry soil full sun - part shade	Bareroot				X	X
Cascara (<i>Rhamnus purshiana</i>)	moist - dry soil full sun - full shade	Bareroot			X	X	
Beaked hazelnut (<i>Corylus cornuta</i>)	moist - dry soil full sun - full shade	Bareroot				X	X

A Calendar for Success - Planting - November thru March

SPECIES	GROWING CONDITIONS	PREFERRED STOCK TYPE	QUANTITY	RIPARIAN PLANTING ZONES			
				Bank	Overbank	Transition	Upland
Douglas spiraea (<i>Spiraea douglasii</i>)	moist - wet soil full sun - part shade	Bareroot		X	X		
Indian plum (<i>Oemleria cerasiformis</i>)	moist - dry soil full sun - full shade	Bareroot				X	X
Mock orange (<i>Philadelphus lewisii</i>)	moist - dry soil full sun - full shade	Bareroot				X	X
Oceanspray (<i>Holodiscus discolor</i>)	moist - dry soil full sun- full shade	Bareroot				X	
Pacific ninebark (<i>Physocarpus capitatus</i>)	moist-wet soil full sun - part shade	Bareroot		X	X	X	
Red elderberry (<i>Sambucus racemosa</i>)	wet -moist soil full sun - full shade	Bareroot			X	X	X
Red-flowering currant (<i>Ribes sanguineum</i>)	moist - dry soil full sun - part shade	Bareroot				X	X

A Calendar for Success - Planting - November thru March

SPECIES	GROWING CONDITIONS	PREFERRED STOCK TYPE	QUANTITY	RIPARIAN PLANTING ZONES			
				Bank	Overbank	Transition	Upland
Red-osier dogwood (<i>Cornus sericea</i>)	wet - moist soil full sun - part shade	Cuttings		X	X		
Serviceberry (<i>Amelanchier alnifolia</i>)	moist - dry soil full sun - part shade	Bareroot				X	X
Snowberry (<i>Symphoricarpos albus</i>)	moist - dry soil sun - shade	Bareroot			X	X	X
Tall Oregon grape (<i>Berberis aquifolium</i>)	well drained soil full sun - full shade	Bareroot				X	X
Wild rose (<i>Rosa spp.</i> -Nootka, clustered, baldhip)	moist - dry soil full sun-part shade	Bareroot			X	X	X
Willows (<i>Salix spp.</i> - Pacific, Sitka)	wet - moist soil full sun	Cuttings		X	X		
Willow - Scouler's (<i>Salix scouleriana</i>)	dry - moist soil full sun	Cuttings		X	X	X	

A Calendar for Success - Planting - November thru March

Plant Installation - Ordering

Nursery	Plant Species	Notes	Is the Order Confirmed?

Storing Plant Material

Proper handling of cuttings and nursery stock before planting is critical to the success of the project. Do not allow cuttings or plants to dry out. Keep all stock moist and cool (34-36 degrees Fahrenheit). Watch carefully for mold. Follow nursery instructions for storage and preparation before planting.

At the planting site, store plant material in the shade or under a reflective tarp until you are ready to put them in bags or buckets for planting. Keep seedlings moist and cool during planting. Put moist peat moss, mulch, newspaper, or other material in your planting bag or bucket with the seedlings to keep the roots from drying out while planting. Limit the number of seedlings in a bag/bucket to prevent root damage.



A Calendar for Success - Planting - November thru March

Tips for Planting Day:

There are several factors to consider when revegetating riparian areas.

- Plant trees ten feet apart. Plant tall shrubs six feet apart. To mimic nature, plant shorter shrubs in clusters of five, with a spacing of at least four feet between groupings.
- Dogwood and willow cuttings should be planted along the stream bank and may be planted as close as one foot apart to help stabilize erosion zones.
- For any species, it is better to plant too close than too far apart because some plants will not survive.
- When planting, consider the maintenance that will need to be done and your ease of access. Plant in rows wide enough for equipment to access your plants. If you prefer a “wilder” setting, then plant randomly, but know that maintenance will require more effort.
- 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.
- If possible, plant on cool, overcast, and calm days when the air temperature is lower than 65 degrees and the soil temperature has reached 35 degrees F.
- Keeping bare 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 sawdust around the roots before they are planted.



Bareroot stock must be planted before the end of March.

A Calendar for Success - Planting - November thru March

Tips for Planting Day, Continued:

- For bareroot stock, dig holes slightly deeper than the roots are long. On bareroot stock, there is usually a change in color on the stem, which indicates the previous planting depth.
- Make sure the roots hang naturally before you start to pack the soil around them. Arrange the roots of seedlings so that they do not form a “J” in the hole. Place the soil in the hole, firming it from the bottom up enough to eliminate large air pockets. Do not compact the soil.
- 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.
- For container stock, dig holes 1 ½ times the diameter of the container and loosen the soil in the bottom of the hole. Plant the seedling at the same depth as it was at the nursery. **Do not disrupt the soil around the roots of containerized plants.**



An example of J-rooting

A Calendar for Success - Planting - November thru March

Cuttings

Certain species native to the Pacific Northwest such as willow, red-osier dogwood, and cottonwood will grow plants from cuttings that are planted in moist soil.

How To Take a Cutting:

- Take cuttings in the fall or early winter after the plants have lost their leaves and are not actively growing (dormant). Choose stems that are 1–3-inch inches in diameter (larger stakes tend to have better success) and cut in 3-6 feet lengths. Choose growth that is disease and insect-free and alive. You can tell this by pushing your fingernail into the bark. If you cannot push it in, the stem is dead. Cut the bottom end, or the end closest to the trunk, at an angle to indicate the bottom of the cutting. Cut the top end of the stem blunt. Do not use the top 2 feet of a stem or branch. Remove all excess branches.
- Take no more than one-third of a stock plant, leaving the rest to grow.

If you choose not to plant right away, you can store your cuttings in a dry, dark place, between 34-38 degrees Fahrenheit. Do not put them in wet burlap or wet newspapers. Willow cuttings can be stored for 1-1.5 months. Waiting any longer will reduce the chance that the cutting will grow.

It is highly recommended to soak the willow cuttings before planting. Soak the bottom half of the cuttings for 14 days in cold water (35 degrees Fahrenheit). You do not want roots to emerge from the bark.

How To Plant a Cutting:

- When planting the cuttings make sure at least half of the cutting is in the ground – two-thirds is preferable. Be sure that 3-4 healthy buds are above ground. If the ground is hard, create pilot holes with steel rebar.
- Consider “muddying” the hole with water for better soil contact. Willows should be planted along the stream bank and may be planted as close as one foot apart. If planting in reed canarygrass, consider planting longer cuttings. Reed canarygrass root mats can be up to 1.5 feet deep, and the top grows 2-9 feet tall.

YOU can often harvest your own cuttings for a free source of material. Identify the trees or shrubs while they still have leaves.

A Calendar for Success - Maintenance - March thru November

Maintenance

Mulch

Mulch can be a natural alternative to herbicide use when trying to reduce weeds around your plants. Additional benefits of mulch include improved soil moisture, reduced wind and rain erosion, reduced rain compaction of soil, regulation of soil temperature, and addition of organic matter to the soil.

Before applying mulch, make sure to clear ground vegetation in a two-foot radius around the planted seedling. Apply wood chip mulch shortly after planting, within one month. Create a circle (or donut) around each stem that is 3-4 inches deep. This will equate to about one 5-gallon bucket of mulch per plant. Leave about two inches of space between the seedling and mulch circle.

Inspect areas periodically and reapply mulch or mechanically remove weeds when needed.

Mulch often attracts rodents, which can cause damage to seedlings.

Contact your local arborist to purchase wood chips for your project. Some companies provide free wood chips that are generated from trees cut down in your neighborhood. Beware that with the free chips you have less control over the species of trees the chips come from, the condition of the mulch you receive, and the date or time of delivery.

Protection Tubes

Often deer, elk, beaver, and rodents damage newly planted trees and shrubs. For the best success, consider protecting your project by using tree tubes/guards if browsing is suspected.

Periodically monitor all plant protection throughout the year to ensure proper functioning. Fix any tubes that have started to lean or have come off completely. Check tubes for wasp nests.

Mesh vexas tubes are a common and economical choice for tree protection in riparian restoration. These tubes often break down over time and can be left on for years. Solid tubes can offer better protection but are more costly and must be removed after 2-3 years to prevent girdling of the plants.



After several years, tree trunks will reach 1.5-2 inches in diameter and the tree protectors will need to be removed to allow unrestricted diameter growth.

A Calendar for Success - Maintenance- March thru November

Competition Control

To control competing vegetation, remove a three-foot radius circle of vegetation around each seedling. This process can be done mechanically multiple times per year. However, it may be more effective and economical to keep this area free of vegetation by using an herbicide. An annual application of glyphosate herbicide, applied by a backpack sprayer or tank sprayer in the **early spring before bud break while trees are dormant** will keep the area free of competing vegetation. Take care to keep the herbicide mixture from contacting the seedlings directly or by drift. Always, follow herbicide label instructions. REMEMBER, the label is the LAW!

Water

Although native plants are adapted to the climate, providing water to your seedlings in the first couple of years can improve their survival. Water once or twice a year during the hot, summer months for the best results.

Monitoring

Control competing vegetation for several years after planting. Assess your site each year to evaluate weed presence.

Watch for damage from wildlife and any unexpected tree and shrub mortality. Replant to fill the voids left by trees or shrubs that die in the first couple of years. Choose new plants based on what is currently doing well on the site and re-evaluate the site conditions to consider new species.

Maintenance		
✓	Activity	Notes:
Year 1		
	Mulch placed	
	Protection tubes placed	
	Spring mowing/spraying circles	
	Summer watering	
	Fall spot spray if needed	
Year 2		
	Spring mowing/spraying circles	
	Summer watering	
	Fall spot spray if needed	
	Protection tubes removed if necessary	
	Replanting if necessary	

Who can I turn to for information and advice? Your local Soil and Water Conservation District has tools and resources to help landowners design and install a successful riparian restoration planting. Watershed Councils are also a good source of information and assistance.

References, Photo Credits, and Acknowledgements

General Riparian Resources

[Natural Resources Conservation Services, Conservation Practice Standard Riparian Forest Buffer Code 391](#)

[A Guide to Riparian Tree and Shrub Planting in the Willamette Valley: Steps to Success.](#)

Property Mapping Resources

[US Department of Agriculture, Web Soil Survey](#)

[Ecotrust Landmapper](#)

Other Organizations That Support Riparian Restoration

[Conservation Reserve Enhancement Program Video](#)

[Oregon Watershed Councils](#)

Herbicides and Invasive Species

[National Pesticide Information Center](#)

[OSU SOLVE Pest and Weed Problems](#)

[Pacific Northwest Pest Management Handbook](#)

[OSU Emerald Ash Borer Resources](#)

Photo Credits:

Jeremy Baker, Clackamas Soil and Water Conservation District - thistle/bumblebee

Stephen McWilliam, iNaturalist - English hawthorn, English holly, Sweet cherry

Jan Samanek, Phytosanitary Administration, Bugwood.org- Old man's beard, English ivy, Japanese knotweed

Sam Leininger, Clackamas Soil and Water Conservation District - Himalayan blackberry

Randal, iNaturalist - Reed canarygrass

Tiffany, iNaturalist - Tall Oregon grape

Laura Holloway, iNaturalist - Black Cottonwood

Alex Heyman, iNaturalist - Red-osier Dogwood

Randal, iNaturalist - Pacific willow

Kate Manning, iNaturalist - Bigleaf maple

Capture the Light, iNaturalist - Indian plum

Clackamas River Basin Council and Clackamas River Water Providers - spray drift poster

Lisa Kilders, Clackamas Soil and Water Conservation District - farm riparian scene

Jenne Reische, Clackamas Soil and Water Conservation District - planters

New Brunswick Today - Emerald ash borer

David J. Moorhead, U of Georgia, Bugwood.org - J-root tree

The remainder of the photographs were purchased from Adobe Stock or were taken by Clackamas SWCD staff.

Plants

[Metro Native Plants for Willamette Valley Yards](#)

[Oregon Flora](#)

[Sound native plants- Live Stakes Installation](#)

Other

[BES How to protect nesting birds](#)

[Native Plant Society - directory of nurseries](#)

Additional Resources:

[How to find my watershed council](#)

[Preparing homes for wildfires](#) - National Fire Protection Association

[Check for fire restrictions in your area map](#)

A special thank you to the Cowlitz Conservation District who graciously gave permission for us to include some text from the Streamside Planting Guide for Western Washington for publication.

Notes

Notes:

