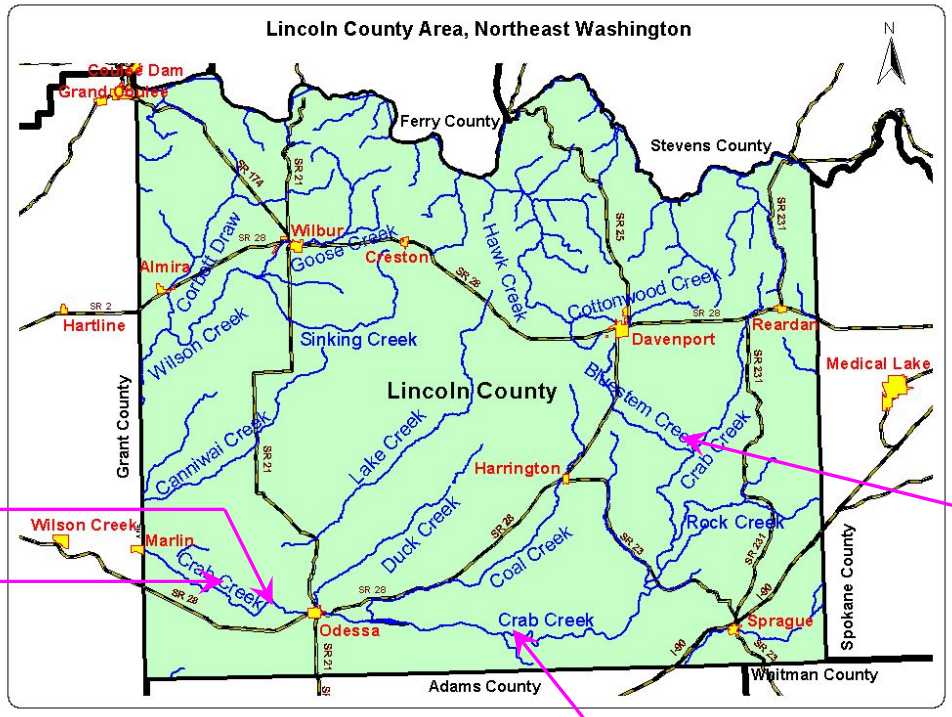
Riparian Planting Guide for Lincoln County

Prepared by the Lincoln County Conservation District **August 2004**

Crab Creek at Napiers Road west of Odessa

Bluestem Creek at Bluestem Road



Crab Creek at Irby

Crab Creek at Rocky Ford Road

Purpose of the Riparian Planting Guide for Lincoln County

The Riparian Planting Guide for Lincoln County was developed to:

- Address some of the issues to consider when designing a riparian restoration planting project.
- Describe the advantages and limitations of riparian plantings for stabilizing streambanks.
- Illustrate where the different riparian trees, shrubs, grasses, and forbs should be planted along the streambank for maximum project success.
- Provide some helpful tips on how to plant trees, shrubs, grasses, and forbs for riparian restoration plantings.
- Illustrate and describe 24 native trees, shrubs, grasses, and forbs that are commonly found along riparian areas in Lincoln County and that are available to purchase from nurseries and seed companies for riparian restoration plantings.

There are many other methods besides riparian plantings that can be used in riparian restoration projects to stabilize streambanks. These methods can include treatments where structures are built and may be combined with riparian plant materials using specialized techniques. The Riparian Planting Guide for Lincoln County does not address these other riparian restoration methods because many more pages would be required to adequately describe them. A good source of reference information on riparian restoration methods is the **Integrated Streambank Protection Guidelines** (ISPG) handbook that was developed by the Washington State Department of Fish and Wildlife (WDFW) in cooperation with the Department of Ecology (Ecology) and Department of Transportation (DOT). The ISPG handbook can be obtained from the Internet at the following address: <http://www.wdfw.wa.gov/hab/ahg/>

Please refer to the two page **Riparian Restoration Brochure for Lincoln County** for a definition of riparian zones, benefits provided by healthy riparian zones, five steps to consider when installing a riparian restoration project on your land, and brief descriptions of two riparian restoration projects installed by the Lincoln County Conservation District in 2003. This brochure is also available from the Lincoln County Conservation District.

For additional questions on riparian restoration plantings or additional copies of the Riparian Planting Guide for Lincoln County, please contact the Lincoln County Conservation District at:

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Some Initial Considerations for Riparian Restoration Plantings

Riparian Planting Objectives: What are the objectives to be achieved by the planting? Identifying the objectives is needed in order to determine how much labor, supplies and equipment along with how much the project will cost and where funding for the project might be obtained (Hoag, 1997):

- If lower water temperature for improved fish habitat is desired, planting taller trees such as willows or cottonwood on the south side of the stream is recommended for providing more shade.
- If improved wildlife habitat is desired, determine the wildlife species in the area and their needs for food and cover so that the appropriate native trees, shrubs, grasses, and forbs can be planted.
- If grazing by livestock or wildlife is a problem, plant trees and shrubs that are less palatable (taste bad).
- If attractive landscaping is desired, consider planting trees and shrubs with colorful flowers, berries, and/or stems in different months throughout the year.
- If more open views of the riparian area are desired, planting lower growing shrubs is recommended.

Planning: Careful planning is needed before a project is started to ensure the project does not cause more problems than it is intended to solve and has a reasonable chance of success (Hoag, 1997). What are the underlying causes of the unstable/undesirable riparian conditions at the site? Treating the symptoms and not the causes of the problem is likely to produce a riparian project with a higher probability of failure sometime in the future (Bentrup and Hoag, 1997):

- Has the hydrology been altered (for example, has the stream become channelized)?
- Are conditions in the watershed upstream responsible for the problem?
- Is there some underlying soil or bedrock condition that contributes to the problem?

Site Inventory:

- Soil moisture and water table conditions at the site need to be evaluated in order to determine if riparian vegetation, including trees and shrubs can survive at the site (Hoag, 1997).
- If no woody vegetation is growing at the site, the reason(s) for the absence needs to be determined. Is it due to lack of moisture, too much moisture, or flooding during the growing season? Is the woody vegetation being severely grazed by livestock or wildlife? Is the vegetation unable to grow at the site due to some other soil or climactic conditions (Hoag, 1997)?
- If soil moisture and/or precipitation is not sufficient for growing riparian trees and shrubs, will some kind of supplemental water be provided until the plants are established (about 2 to 3 years after planting)? Can long willow or cottonwood poles be planted deep enough to reach into the lowest water table during the year?
- If grazing by livestock or wildlife is a problem, can reasonable measures be taken to protect the plantings until they are established?

How wide should the riparian zone be in order for it to be effective? As a general rule, the height of the tallest native tree that grows in the local area is a good starting point for the recommended width of the riparian zone. The wider the riparian zone is, the more benefit it can provide to the stream. However, the local soil and moisture conditions, topography and size of the stream will determine the maximum width of riparian zone that can be supported (Ecology, 2004).

Crab Creek at Horseshoe Bend

Canby Creek at Bluestem Road

Crab Creek at Marlin

Advantages and Limitations of Riparian Restoration Plantings (Bentrup & Hoag, 1998):

A riparian area in good condition.

Advantages

- Less expensive than other riparian restoration methods.
- Can be installed by landowners/volunteers.
- Native plants on or near the site can be used.
- Minimal disturbance is done to the site during planting.
- Streambank soil is stabilized by an extensive network of roots.
- Annual plant growth increases protection to the streambank every year.
- Provides riparian habitat.
- Helps to slow down and absorb water and to filter out pollutants.
- Provides a more attractive and natural appearing riparian area.

Limitations

- Riparian plantings require maintenance. They need to be watered, weeded and protected from grazing until they become fully established.
- Plantings may not grow or thrive as intended.
- Plantings alone may not be enough to protect the toe of the streambank from further erosion. Severe erosion of the toe may undercut riparian plantings and cause part of the streambank to fall or slide into the stream.
- Plantings may be uprooted by freezing/thawing of the soil or by ice or other debris carried by flood waters.
- Plantings may be damaged or destroyed by wildlife.

A riparian area in poor condition that would benefit from riparian restoration plantings.

More Considerations for Riparian Restoration Plantings

- Use of native plants, including cuttings or seedlings from plants on or near the site is recommended. Native riparian plants have been growing in Lincoln County for thousands of years and are adapted to the summer and winter climate of Eastern Washington. These native plants have natural defenses against insect and disease and will not have unexpected impacts on the environment in the riparian zone (Ecology, 2004).
- A mixture of trees and shrubs with deeper tap roots and grasses and forbs with fibrous roots provides the maximum amount of protection to the streambank from water erosion.
- Frequent disturbance in riparian zones tends to favor those plant species that can recover quickly from flood damage and get reestablished on the streambank.
- For a riparian planting to succeed and become established, the **right plant species** need to be planted in the **right location** in the riparian zone. The major reasons for the different plant communities across the riparian zone include:
    1) Tolerance to flooding and accumulation of flood deposits.
    2) The difference in plant ability to obtain water from the soil as soil moisture steadily decreases from the stream up the streambank to the adjacent uplands.
    3) The tolerance of the plants to wet, saturated soils along the stream versus droughty soils on uplands.

  Please refer to diagram on the following page with the five riparian zones and native plants that are recommended for planting in each zone in the Lincoln County.

Figure 1: Riparian Zones and Species to Plant in Lincoln County

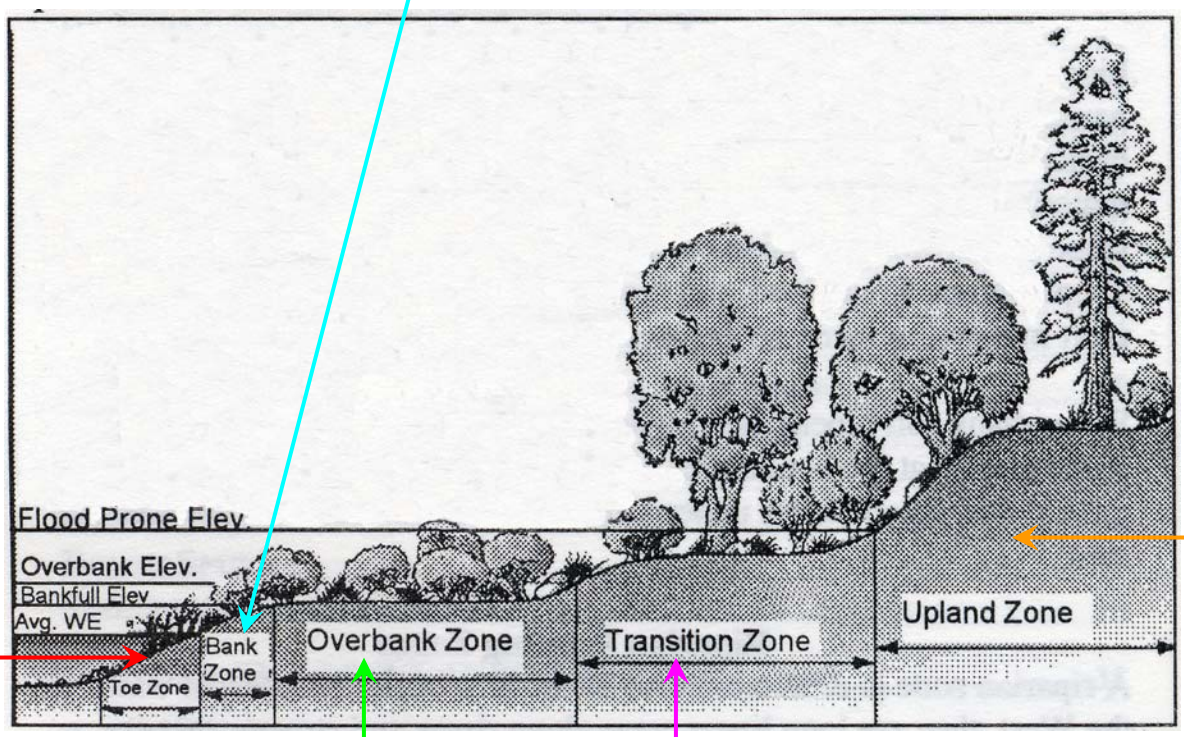
The riparian zone diagram and zone descriptions are adapted from Hoag & Fripp, 2002. Local plants have been inserted into the descriptions below. **Not all riparian areas in Lincoln County have all five riparian zones!**

Toe Zone

- Area below average water elevation
- Too wet for woody vegetation
- Rock or other inert material may be needed to stabilize the toe.
- *Species to Plant*: American manna-grass, Baltic rush, bur-reed, common spikerush, hardstem bulrush, Nebraska sedge, Northwest Territory sedge.

Bank Zone

- Area between average water elevation and bankfull flow elevation. Bankfull flow is the high water level reached about every 1.5 years.
- Due to high flow and frequent flooding, rock or other hard structures are often used in conjunction with vegetation in this zone.
- *Species to Plant:* American mannagrass, Baltic rush, broadfruit bur-reed, common spikerush, hardstem bulrush, Nebraska sedge, Northwest Territory sedge. Shrubs and small trees with flexible stems such as coyote willow, redosier dogwood, thinleaf alder, water birch, and yellow willow that will bend with floodwaters, will not be easily uprooted, and will return back to normal once flood waters have receded.



Overbank Zone

- Area between bankfull flow elevation and the overbank flow elevation. This typically flat area is flooded about every 2 to 5 years and often has layered soils from frequent sediment deposition. Vegetation is usually flood tolerant and much of it may be wet tolerant plants.
- *Species to Plant:* American mannagrass, Baltic rush. Shrubs and small trees with flexible stems such as coyote willow, redosier dogwood, thinleaf alder, water birch and yellow willow.
- *Upper portions of Overbank Zone*: Aspen, black cottonwood, blue elderberry, chokecherry, Douglas hawthorn, golden currant, mock orange, serviceberry, snowberry, and Woods' rose.

Transition Zone

- Area between overbank elevation and flood prone elevation.
- Flood prone elevation is about 2 times the bankfull elevation.
- This area may flood once every 50 years or less. Vegetation does not need to be very flood tolerant and is transitioning to more drought tolerant upland plants, including larger tree species.
- *Species to Plant:* Aspen, black cottonwood, (with moisture); basin wildrye, chokecherry, Douglas hawthorn, blue elderberry, golden currant, mock orange, serviceberry, snowberry, thickspike wheatgrass, and Woods' rose.

Upland Zone

- Area adjacent to and above the flood prone elevation.
- *Species to Plant:* basin wildrye, thickspike wheatgrass; more drought tolerant shrubs such as chokecherry, elderberry and Woods' rose along the lower edge of this zone.

Types of Tree and Shrub Planting Stock for Riparian Restoration Projects:

Cuttings (Bentrup & Hoag, 1998):

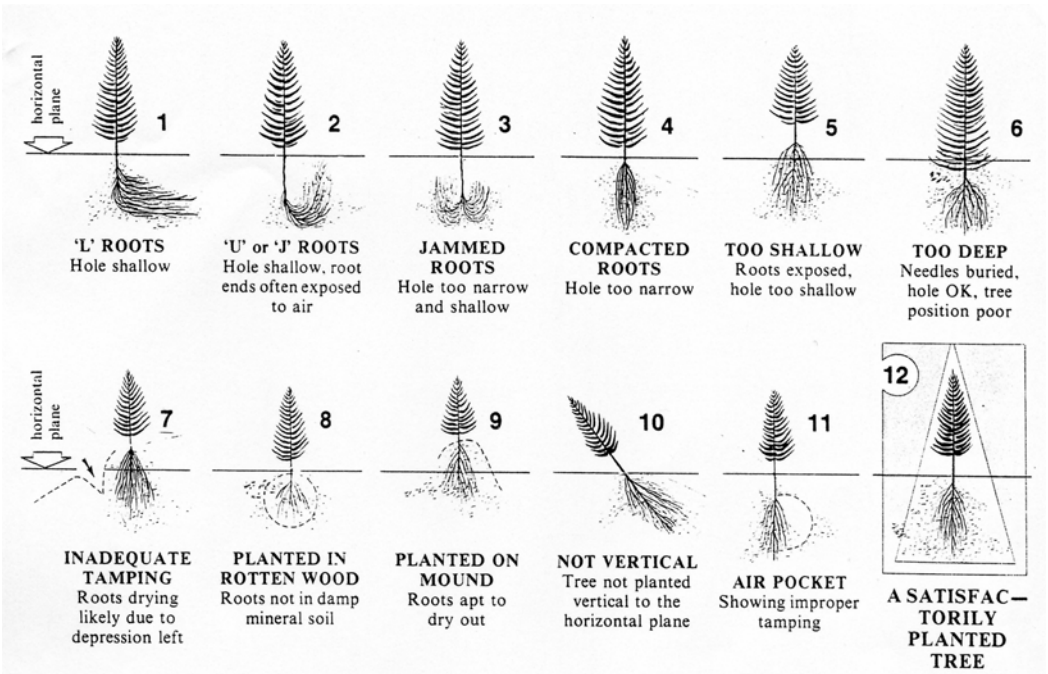
- Cuttings consist of long branches with any side branches cut off. There are two size classes of cuttings recommended for riparian plantings:
    1) Poles - 1/2" to about 3" in diameter and 2 to 6 years old. Recommended for use because they still have abundant rooting hormones and have adequate energy reserves for rooting and growth.
    2) Posts - greater than 3" in diameter and less than 7 years old. Recommended for use where larger and stronger cuttings are required.
- Only a few species of riparian trees and shrubs are suitable for cuttings because they have root buds along the entire length of the cutting that can readily grow roots when placed in moist soil:
    1) Willows
    2) Cottonwood
    3) Poplar
    4) Dogwood (redosier dogwood will only root along the stem if the stem is scratched or bruised)

  It is more difficult to get cuttings of aspen, water birch, thinleaf alder, and most other species of riparian plants to root. Seedlings or transplants of these species are required for most successful plantings.
- Advantages of cuttings for riparian plantings:
    1) Inexpensive
    2) Readily available from nurseries
    3) Easy to harvest and store on your own.
    4) Easy to plant and replant, if necessary
    5) Large numbers can be planted rapidly with planting bars, augers, or a waterjet stinger (Hoag, Simonson et al, 2001).
    6) Long poles or posts can be planted 3 to 10 feet deep or more to reach a deep water table.
- Planting recommendations for cuttings:
    1) Take dormant cuttings after leaf drop in fall and before leaf buds swell in spring. Take only a few cuttings (< 1/3 of stems) from the center of each parent plant.
    2) Cuttings placed in a cool, dark and moist location at 34 - 37 ºF can be stored for 4 months. Cuttings need to be stored dry so that roots will not emerge until after planting.
    3) Cuttings should be ½" or larger in diameter to provide more energy for rooting and growth.
    4) The bottom of the cutting needs to extend 5 to 10" into the lowest water table during the year.
    5) The bottom of the cutting also needs to reach below the roots of competing grass and other vegetation that commonly extend 18 to 24" deep into the soil.
    6) The top of the cutting needs to extend above the shade produced by competing vegetation.
    7) About 2/3rd of the cutting should be placed into the ground.
    8) For the above reasons, cuttings are typically 3 feet long or longer.
    9) The top or apical bud of the cuttings should be cut off to encourage rooting along the stem.
    10) All side branches should be cut off.
    11) The tops of the cuttings should be sealed with white latex paint to prevent drying and to mark the top end of the cutting that needs to be placed above ground level when planted.
    12) Cuttings should be soaked in water for at least 24 hours to swell the root buds along the length of stem to be placed into the ground. Soaking for 5 to 7 days is better but longer soaking is not recommended since fragile little roots will emerge and can be easily broken off during planting.
    13) At least 1 to 2 buds need to be above ground for successful growth.
    14) <u>Good stem to soil contact along the entire length of cutting in the ground is needed for rooting!</u>
    15) Cuttings of small willows or dogwoods with flexible steams are recommended for the bank and overbank zones where occasional to frequent flooding will bend but not uproot the plants.
    16) Spring planting has many advantages over fall planting because the water table and soil moisture is higher, frost heave and the threat of being washed away soon after planting can be avoided, a longer growing season is available after planting, and nursery stock is more available in spring.

Bare Root Stock and Containerized Plants

- Bare root stock and containerized plants are best used and most successful where (Hoag, 1997):
    1) planted on the middle or upper streambank where the hazard of flooding or water erosion is reduced.
    2) adequate soil moisture close to the surface for the riparian species planted or where supplemental irrigation is available.
    3) there is not much competing vegetation or where a 2.5' diameter area around each plant can be cleared off or covered with weed control fabric during planting to help reduce competition.
    4) riparian plantings have a lower risk of being pulled out or washed out due to shallow, undeveloped roots for the first year or two after planting.
- Planting recommendations:
    1) Bare root stock should be stored in a cool, moist and dark area at 34 to 37 ºF until planting.
    2) Bare root stock should be soaked for 24 hours before planting. Dipping the roots in water absorbing polymers such as Terra Sorb will help the roots retain moisture longer after planting.
    3) Containerized plants in pots need to be "hardened off" or acclimatized to the weather outside of the greenhouse for 1 to 2 weeks in a cool, partially shaded location.
    4) Bare root stock or containerized plants need to be planted in the ground at the same depth that it was previously growing at the nursery or in the pot. Bare root stock usually has an enlargement of the stem called the root node that forms just below the ground surface.
    5) If the plants are going to be hand watered with 5 gallon buckets, it is helpful to plant within a 1 foot diameter hole that when completed is 3 to 5 inches below the surrounding ground surface. This depression will catch and hold a large amount of water to percolate deeper into the ground at each watering. It is much easier to dig this type of hole at planting than to build a ring of soil around the plant later on to catch and hold water.
    6) As with cuttings, planting bare root stock or containerized plants in spring has advantages over fall planting. Planting should be done as soon as possible in the spring after the ground unthaws to allow as much time as possible for the plants to begin growing roots and become established before the weather gets hot and dry in summer. Plantings on north slopes, in other shaded areas or that are mulched hold on to moisture longer.

Figure 2: How to Satisfactorily Plant Trees and Shrubs (Example # 12) (Hanley, 1984)



Protecting Riparian Restoration Plantings

Cuttings, bare root stock and containerized plants in riparian plantings will benefit from some type of protection against grazing by livestock, deer, beaver, porcupine, gophers, mice, etc. Protecting riparian plantings requires additional time, effort and money but is a worthwhile investment because the survival rate of the trees and shrubs planted is significantly increased.

- Barb wire livestock fences can protect large areas of plantings from grazing by livestock, but these fences can't guarantee protection from wildlife such as deer, beaver and porcupines.
- Cages made of utility fencing will provide more secure protection from wildlife.
- Various types of repellants can be sprayed on plants to discourage grazing such as chemical repellants with a bitter taste, putrefied egg repellants and repellants made with dried animal blood.
- Paper tree wrap and plastic tree guards will protect the stems from girdling by mice and from sunscald.

Barbed wire fence with five wires and fence stays used to exclude livestock from a new riparian planting.

Wire cage used to protect trees and shrubs from grazing.

Some Planting Considerations for Grasses and Forbs

- Season of planting, seeding rate and method of seeding are three factors to consider when seeding grasses and forbs (Hoag, Wyman et al, 2001).
    1) A fall dormant planting can work better than spring planting where the ground surface dries out quickly, supplemental irrigation is not available or practical, and where the spring runoff is not likely to float or wash away the seeds.
    2) A grass seed drill can work well on larger areas with gentle slopes, but broadcast seeding may be the only practical alternative for seeding on narrow, sloping streambanks with wet soils.
    3) Excessive seeding rates should be avoided to prevent competition between seedlings.
    4) Some seeds need to be abraded (scratched) in order to sprout.
    5) Many wetland grass and forb seeds need light in order to sprout and should not be covered with soil.
    6) Grass seed should be covered with no more than 1/4" to 1/2" of soil depending on seed size.
- Many wetland plants can be successfully transplanted using small plugs dug with 5 to 6" of soil and small sections of roots or underground stems (rhizomes) that are planted into wet soil.
- Weed control, if needed, is more easily done before planting than after planting.
    1) Competition from reed canarygrass may be a problem. Repeated defoliation (mowing or grazing), ponded water in summer, properly applied herbicides, or covering the grass with biodegradable weed control fabric or landscape fabric are some of the methods that can be used to eventually weaken and kill canarygrass. Weed control efforts need to be followed with revegetation of the streambank with other adapted plants for eventual control of canarygrass (Stannard and Crowder, 2001).
    2) Spraying herbicides on canary grass or other weeds in the riparian zone should be done by a licensed applicator.
    3) Care must be taken to avoid spray drift from harming adjacent riparian vegetation or contaminating the stream.

Native Riparian Plants Recommended for Riparian Restoration Projects in Lincoln County

The following is a description of some common and widespread riparian plants that are native to Lincoln County and are available from commercial nurseries. **Not all riparian plants in the county are included!** Contact your local Natural Resources Conservation Service (NRCS) or Conservation District office for lists of local nurseries and specific planting recommendations.

All photos of the riparian trees, shrubs, grasses, and forbs were taken in Lincoln County. The primary source of information for the text accompanying the photos of each riparian plant species was taken from the NRCS PLANTS Database on the Internet at http://plants.usda.gov/ Local observations of riparian plants in Lincoln County were used to modify the anaerobic tolerance, drought tolerance and cold tolerance ratings from the PLANTS database for a few of the riparian trees and shrubs in order to help equalize the ratings between plant species where applicable. Supplemental information was also obtained from several NRCS Plant Material Center Technical Notes (Ogle et al, 2000) and (Hoag, Wyman et al, 2001). *The scientific name is listed in italics underneath the common name.*

Definitions for Riparian Plant Descriptions

- ***"Alkaline soils"*** have high soil pH.
- ***"Anaerobic tolerance"*** refers to the ability of plants to survive in wet, saturated soils with no oxygen.
- ***"Coarse textured soils"*** are dominated by sand. They typically have large soil pores, high permeability, low available water holding capacity, and weak soil structure. Loamy sand is an example of a typical coarse textured soil.
- ***"Drought tolerance"*** refers to the ability of plants to survive in dry soils during the hot summer months.
- ***"Fine textured soils"*** are dominated by clay with some silt and sand. They typically have many small soil pores, low permeability, moderate available water holding capacity, and strong soil structure. Silty clay loam is an example of a fine textured soil.
- ***"Medium textured soils"*** have moderate amounts of sand, silt and clay. They typically have many intermediate size soil pores, moderate permeability, high available water holding capacity, and moderate or strong soil structure. Silt loam is an example of a medium textured soil.
- ***"Moisture Use"*** refers to the relative amount of water required by a plant species each year for normal growth and development.
- ***"Rhizomatous"*** means the plant spreads laterally from shallow underground roots and underground stems (rhizomes).
- ***"Saline soils"*** have elevated levels of salts.
- ***"Soil texture"*** (as described by coarse, medium and fine textured soils) refers primarily to the fraction of soil that is less than 2 millimeters (mm) in diameter. Sand is the largest soil particle size, silt is intermediate in size and clay is the smallest soil particle size in the fraction of soil less than 2 mm in diameter. Coarse, medium and fine textured soils may also contain rock fragments that are larger than 2 mm. Gravel is 2 mm to 3 inches in diameter, cobbles are 3 to 10 inches in diameter and stones are 10 to 24" in diameter according to United States Department of Agriculture (USDA) classification (Soil Survey Division Staff, 1993).
- ***"Sprigs"*** are small sections of roots or stems used for plant propagation.
- ***"Thickets"*** are dense growths of trunks, branches and leaves formed by some shrubs or small trees.

Native Riparian Trees and Shrubs Recommended for Riparian Restoration Projects in Lincoln County

Black Cottonwood
(Populus balsamifera trichocarpa)

Where to Plant: **Upper Overbank and Transition Zones**
Plant Type: **Tree**
Growth Rate: **Rapid**
Growth Form: **Single Stem**
Mature Height: **100 feet**
Lifespan: **Moderate**
Adapted to: **Coarse, Medium and Fine Textured Soils**
Minimum Rooting Depth: **30"**
Anaerobic Tolerance: **Low**
Drought Tolerance: **Low**
Moisture Use: **High**
Shade Tolerance: **Intolerant**
Salinity Tolerance: **None**
Cold Tolerance: **- 48 ºF**
Resprout Ability: **Yes**
Propagated by: **Cuttings, Seed**
Note: **"Cotton" from seeds may aggravate allergies. Cottonwood should not be planted below the upper overbank zone.**

Blue Elderberry
(Sambucus nigra cerulea)

Where to Plant: **Overbank, Transition and Upland Zones**
Plant Type: **Tree**
Growth Rate: **Rapid**
Growth Form: **Multiple Stem**
Mature Height: **25 feet**
Lifespan: **Moderate**
Adapted to: **Coarse and Medium Textured Soils**
Minimum Rooting Depth: **12"**
Anaerobic Tolerance: **Medium**
Drought Tolerance: **Medium**
Moisture Use: **Low**
Shade Tolerance: **Intermediate**
Salinity Tolerance: **None**
Cold Tolerance: **- 38 ºF**
Resprout Ability: **Yes**
Propagated by: **Seed**
Note: **The blue berries ripen in late summer/early fall and are eaten by wildlife.**

Chokecherry
(Prunus virginiana)

Where to Plant: **Overbank, Transition and Upland Zones**
Plant Type: **Tree**
Growth Rate: **Rapid**
Growth Form: **Thicket Forming**
Mature Height: **20 feet**
Lifespan: **Short**
Adapted to: **Coarse, Medium and Fine Textured Soils**
Minimum Rooting Depth: **24"**
Anaerobic Tolerance: **Low**
Drought Tolerance: **Medium**
Moisture Use: **Medium**
Shade Tolerance: **Intermediate**
Salinity Tolerance: **Low**
Cold Tolerance: **- 38 ºF**
Resprout Ability: **Yes**
Propagated by: **Seed**
Note: **Wildlife eat the reddish-purple fruits. Hydrocyanic acid in the leaves is toxic to livestock if eaten in large amounts. Livestock usually avoid the leaves.**

Native Riparian Trees and Shrubs Recommended for Riparian Restoration Projects in Lincoln County

Coyote Willow
(Salix exigua)

Where to Plant: **Bank and Overbank Zones**
Plant Type: **Tree**
Growth Rate: **Rapid**
Growth Form: **Rhizomatous**
Mature Height: **10 feet**
Lifespan: **Moderate**
Adapted to: **Coarse and Medium Textured Soils**
Minimum Rooting Depth: **20"**
Anaerobic Tolerance: **High**
Drought Tolerance: **Medium**
Moisture Use: **High**
Shade Tolerance: **Intermediate**
Salinity Tolerance: **Low**
Cold Tolerance: **-38 ºF**
Resprout Ability: **Yes**
Propagated by: **Cuttings**
Note: **Cuttings can be planted in the bank zone to reduce floodwater velocity. The flexible stems will bend downstream with high water but will return upright once the high water has receded. A superior willow for riparian restoration plantings and stream bank stabilization projects.**

Douglas Hawthorn
(Crataegus douglasii)

Where to Plant: **Overbank and Transition Zones**
Plant Type: **Tree**
Growth Rate: **Moderate**
Growth Form: **Thicket Forming**
Mature Height: **25 feet**
Lifespan: **Moderate**
Adapted to: **Coarse, Medium and Fine Textured Soils**
Minimum Rooting Depth: **12"**
Anaerobic Tolerance: **Medium**
Drought Tolerance: **Medium**
Moisture Use: **High**
Shade Tolerance: **Intermediate**
Salinity Tolerance: **None**
Cold Tolerance: **-38 ºF**
Resprout Ability: **Yes**
Propagated by: **Seed, Cuttings**
Note: **Wildlife eat the purplish-black fruits. Has ½" thorns and some limited resistance to grazing and beavers.**

Golden Currant
(Ribes aureum)

Where to Plant: **Overbank and Transition Zones**
Plant Type: **Shrub**
Growth Rate: **Moderate**
Growth Form: **Rhizomatous**
Mature Height: **10 feet**
Lifespan: **Long**
Adapted to: **Medium Textured Soils**
Minimum Rooting Depth: **20"**
Anaerobic Tolerance: **Low**
Drought Tolerance: **Medium**
Moisture Use: **Low**
Shade Tolerance: **Intermediate**
Salinity Tolerance: **None**
Cold Tolerance: **-38 ºF**
Resprout Ability: **Yes**
Propagated by: **Seed**
Note: **The ripe berries in summer are typically dark purple but can be orange on some plants.**

Native Riparian Trees and Shrubs Recommended for Riparian Restoration Projects in Lincoln County

Mock Orange
(Philadephus lewisii)

Where to Plant: **Overbank and Transition Zones**
Plant Type: **Shrub**
Growth Rate: **Moderate**
Growth Form: **Multiple Stem**
Mature Height: **12 feet**
Lifespan: **Moderate**
Adapted to: **Coarse and Medium Textured Soils**
Minimum Rooting Depth: **6”**
Anaerobic Tolerance: **Low**
Drought Tolerance: **Medium**
Moisture Use: **Low**
Shade Tolerance: **Intolerant**
Salinity Tolerance: **None**
Cold Tolerance: **-30 ºF**
Resprout Ability: **Yes**
Propagated by: **Seed, Cuttings**
Note: **Has very fragrant white flowers. Commonly found in gravelly or rocky soils.**

Quaking Aspen
(Populus tremuloides)

Where to Plant: **Upper Overbank and Transition Zones**
Plant Type: **Tree**
Growth Rate: **Rapid**
Growth Form: **Single Stem**
Mature Height: **65 feet**
Lifespan: **Short**
Adapted to: **Coarse, Medium, and Fine Textured Soils**
Minimum Rooting Depth: **32”**
Anaerobic Tolerance: **Low**
Drought Tolerance: **Low**
Moisture Use: **High**
Shade Tolerance: **Intolerant**
Salinity Tolerance: **None**
Cold Tolerance: **-38 ºF**
Resprout Ability: **Yes**
Propagated by: **Seed, Cuttings**
Note: **Spreads and regenerates from shallow roots close to the surface. Like cottonwood, aspen should not be planted below the upper overbank zone because large floods may uproot this tree.**

Redosier Dogwood
(Cornus sericea)

Where to Plant: **Bank and Overbank Zones**
Plant Type: **Tree**
Growth Rate: **Moderate**
Growth Form: **Multiple Stem**
Mature Height: **20 feet**
Lifespan: **Long**
Adapted to: **Coarse, Medium, and Fine Textured Soils**
Minimum Rooting Depth: **16”**
Anaerobic Tolerance: **High**
Drought Tolerance: **Medium**
Moisture Use: **Medium**
Shade Tolerance: **Intermediate**
Salinity Tolerance: **None**
Cold Tolerance: **-38 ºF**
Resprout Ability: **Yes**
Propagated by: **Cuttings, Seed**
Note: **The white berries are eaten by wildlife.**

Native Riparian Trees and Shrubs Recommended for Riparian Restoration Projects in Lincoln County

Serviceberry
(Amelanchier alnifolia)

Where to Plant: **Overbank and Transition Zones**
Plant Type: **Tree**
Growth Rate: **Moderate**
Growth Form: **Multiple Stem**
Mature Height: **15 feet**
Lifespan: **Long**
Adapted to: **Coarse, Medium and Fine Textured Soils**
Minimum Rooting Depth: **24"**
Anaerobic Tolerance: **None**
Drought Tolerance: **Medium**
Moisture Use: **Medium**
Shade Tolerance: **Intermediate**
Salinity Tolerance: **None**
Cold Tolerance: **-38 ºF**
Resprout Ability: **Yes**
Propagated by: **Seed**
Note: **The purple berries ripen in mid-summer and are eaten by wildlife.**

Snowberry
(Symphoricarpos albus)

Where to Plant: **Overbank and Transition Zones**
Plant Type: **Sub-shrub**
Growth Rate: **Moderate**
Growth Form: **Rhizomatous**
Mature Height: **5 feet**
Lifespan: **Long**
Adapted to: **Coarse, Medium, and Fine Textured Soils**
Minimum Rooting Depth: **18"**
Anaerobic Tolerance: **None**
Drought Tolerance: **Medium**
Moisture Use: **Medium**
Shade Tolerance: **Intolerant**
Salinity Tolerance: **None**
Cold Tolerance: **-38 ºF**
Resprout Ability: **Yes**
Propagated by: **Seed**
Note: **The white berries ripen in late summer/early fall and are eaten by wildlife.**

Thinleaf Alder
(Alnus incana)

Where to Plant: **Bank and Overbank Zones**
Plant Type: **Tree**
Growth Rate: **Rapid**
Growth Form: **Thicket Forming**
Mature Height: **30 feet**
Lifespan: **Moderate**
Adapted to: **Coarse and Medium Textured Soils**
Minimum Rooting Depth: **18"**
Anaerobic Tolerance: **High**
Drought Tolerance: **Low**
Moisture Use: **High**
Shade Tolerance: **Intermediate**
Salinity Tolerance: **None**
Cold Tolerance: **-33 ºF**
Resprout Ability: **Yes**
Propagated by: **Seed**
Note: **Similar in appearance to water birch. Thinleaf alder can be found growing in the same location as water birch.**

Native Riparian Trees and Shrubs Recommended for Riparian Restoration Projects in Lincoln County

Water Birch
(Betula occidentalis)

Where to Plant: **Bank and Overbank Zones**
Plant Type: **Tree**
Growth Rate: **Rapid**
Growth Form: **Single Stem**
Mature Height: **50 feet**
Lifespan: **Short**
Adapted to: **Coarse, Medium, and Fine Textured Soils**
Minimum Rooting Depth: **20"**
Anaerobic Tolerance: **Medium**
Drought Tolerance: **Low**
Moisture Use: **High**
Shade Tolerance: **Intermediate**
Salinity Tolerance: **None**
Cold Tolerance: **-28 ºF**
Resprout Ability: **Yes**
Propagated by: **Seed**
Note: **Water birch seedlings require shade in summer to become established.**

Woods' Rose
(Rosa woodsii)

Where to Plant: **Overbank, Transition and Upland Zones**
Plant Type: **Shrub**
Growth Rate: **Rapid**
Growth Form: **Rhizomatous**
Mature Height: **5 feet**
Lifespan: **Long**
Adapted to: **Coarse and Medium Textured Soils**
Minimum Rooting Depth: **12"**
Anaerobic Tolerance: **Low**
Drought Tolerance: **Medium**
Moisture Use: **Medium**
Shade Tolerance: **Intermediate**
Salinity Tolerance: **None**
Cold Tolerance: **-43 ºF**
Resprout Ability: **Yes**
Propagated by: **Seed, Sprigs**
Note: **The red rose hips are eaten by wildlife and remain on this shrub throughout winter.**

Yellow Willow
(Salix lutea)

Where to Plant: **Bank and Overbank Zones**
Plant Type: **Tree**
Growth Rate: **Rapid**
Growth Form: **Multiple Stem**
Mature Height: **16 feet**
Lifespan: **Moderate**
Adapted to: **Coarse, Medium and Fine Textured Soils**
Minimum Rooting Depth: **10"**
Anaerobic Tolerance: **Medium**
Drought Tolerance: **Low**
Moisture Use: **High**
Shade Tolerance: **Intermediate**
Salinity Tolerance: **None**
Cold Tolerance: **-43 ºF**
Resprout Ability: **Yes**
Propagated by: **Cuttings**
Note: **Yellow willow can often be found growing together with coyote willow. Cuttings can be planted in the bank zone to reduce floodwater velocity. The flexible stems will bend downstream with high water but will return upright once the high water has receded.**

Native Riparian Grasses and Forbs Recommended for Riparian Restoration Projects in Lincoln County

American Mannagrass
(Glyceria grandis)

Where to Plant: **Toe, Bank and Overbank Zones**
Plant Type: **Grass Family**
Growth Rate: **Moderate**
Growth Form: **Rhizomatous**
Mature Height: **5.5 feet**
Lifespan: **Short**
Adapted to: **Fine and Medium Textured Soils**
Minimum Rooting Depth: **4"**
Anaerobic Tolerance: **High**
Drought Tolerance: **Low**
Moisture Use: **Medium**
Shade Tolerance: **Tolerant**
Salinity Tolerance: **None**
Cold Tolerance: **-35 ºF**
Propagated by: **Sprigs**
Seedling Vigor: **Medium**
Vegetative Spread Rate: **Slow**
Note: **Provides good wildlife food and cover. Excellent soil stabilizer. Tolerates alkaline soils. This grass is good for habitat restoration on wet soils and along streams.**

Baltic Rush
(Juncus balticus)

Where to Plant: **Toe, Bank and Overbank Zones**
Plant Type: **Grass Family**
Growth Rate: **Rapid**
Growth Form: **Rhizomatous**
Mature Height: **4 feet**
Lifespan: **Long**
Adapted to: **Coarse, Medium, and Fine Textured Soils**
Minimum Rooting Depth: **20"**
Anaerobic Tolerance: **High**
Drought Tolerance: **Low**
Moisture Use: **High**
Shade Tolerance: **Intolerant**
Salinity Tolerance: **High**
Cold Tolerance: **-43 ºF**
Propagated by: **Seed, Sprigs**
Seedling Vigor: **Medium**
Vegetative Spread Rate: **Rapid**
Note: **Provides wildlife food and cover. Excellent soil stabilizer; resists trampling. Tolerates alkaline soils and a wide range of soil moisture conditions. Can grow in drier areas than other wetland plants.**

Basin Wildrye
(Leymus cinereus)

Where to Plant: **Transition and Upland Zones**
Plant Type: **Grass Family**
Growth Rate: **Moderate**
Growth Form: **Bunch Grass**
Mature Height: **5 feet**
Lifespan: **Long**
Adapted to: **Coarse, Medium and Fine Textured Soils**
Minimum Rooting Depth: **16"**
Anaerobic Tolerance: **Medium**
Drought Tolerance: **Medium**
Moisture Use: **High**
Shade Tolerance: **Intolerant**
Salinity Tolerance: **High**
Cold Tolerance: **-43 ºF**
Propagated by: **Seed**
Seedling Vigor: **Medium**
Vegetative Spread Rate: **Slow**
Note: **Provides wildlife food and cover in drier areas along upper portions of riparian areas. Magnar and Trailhead are common cultivated varieties.**

Native Riparian Grasses and Forbs Recommended for Riparian Restoration Projects in Lincoln County

Broadfruit Bur-Reed
(Sparganium eurycarpum)

Where to Plant: **Toe and Bank Zones**
Plant Type: **Forb**
Growth Rate: **Moderate**
Growth Form: **Colonizing**
Mature Height: **5 feet**
Lifespan: **Moderate**
Adapted to: **Coarse, Medium and Fine Textured Soils**
Minimum Rooting Depth: **12"**
Anaerobic Tolerance: **High**
Drought Tolerance: **None**
Moisture Use: **High**
Shade Tolerance: **Intermediate**
Salinity Tolerance: **None**
Cold Tolerance: **-33 ºF**
Propagated by: **Seed, Sprigs**
Seedling Vigor: **High**
Vegetative Spread Rate: **Rapid**
Note: **Provides wildlife food and cover. Commonly found in shallow water. Looks similar to and may be confused with cattails. May spread across narrow, slow flowing streams and restrict stream flow.**

Common Spikerush
(Eleocharis palustris)

Where to Plant: **Toe and Bank Zones**
Plant Type: **Grass Family**
Growth Rate: **Moderate**
Growth Form: **Rhizomatous**
Mature Height: **1.3 feet**
Lifespan: **Moderate**
Adapted to: **Coarse and Fine Textured Soils**
Minimum Rooting Depth: **14"**
Anaerobic Tolerance: **High**
Drought Tolerance: **Low**
Moisture Use: **High**
Shade Tolerance: **Intolerant**
Salinity Tolerance: **Low**
Cold Tolerance: **-38 ºF**
Propagated by: **Seed, Sprigs**
Seedling Vigor: **Medium**
Vegetative Spread Rate: **Moderate**
Note: **Provides good wildlife food and cover. Resists trampling and is tolerant of alkaline and saline soils. Can tolerate water up to 6 inches deep. Has the ability to fix nitrogen from the air and make it available in the soil.**

Hardstem Bulrush
(Schoenoplectus acutus)

Where to Plant: **Toe and Bank Zones**
Plant Type: **Grass Family**
Growth Rate: **Moderate**
Growth Form: **Rhizomatous**
Mature Height: **10 feet**
Lifespan: **Long**
Adapted to: **Medium and Fine Textured Soils**
Minimum Rooting Depth: **14"**
Anaerobic Tolerance: **High**
Drought Tolerance: **Medium**
Moisture Use: **High**
Shade Tolerance: **Intolerant**
Salinity Tolerance: **Low**
Cold Tolerance: **-38 ºF**
Propagated by: **Seed, Sprigs**
Seedling Vigor: **Medium**
Vegetative Spread Rate: **Moderate**
Note: **Provides good wildlife food and cover. Tolerant of alkaline soils. Commonly found in areas of standing water several feet deep. May spread across narrow, slow flowing streams and restrict stream flow.**

Native Riparian Grasses and Forbs Recommended for Riparian Restoration Projects in Lincoln County

Nebraska Sedge
(Carex nebrascensis)

Where to Plant: **Toe and Bank Zones**
Plant Type: **Grass Family**
Growth Rate: **Moderate**
Growth Form: **Rhizomatous**
Mature Height: **3 feet**
Lifespan: **Long**
Adapted to: **Coarse, Medium and Fine Textured Soils**
Minimum Rooting Depth: **10"**
Anaerobic Tolerance: **High**
Drought Tolerance: **None**
Moisture Use: **High**
Shade Tolerance: **Intolerant**
Salinity Tolerance: **Low**
Cold Tolerance: **-38 ºF**
Propagated by: **Seed, Sprigs**
Seedling Vigor: **Low**
Vegetative Spread Rate: **Moderate**
Note: **Provides good wildlife food and cover. Excellent soil stabilizer. Tolerates alkaline soils and a range of soil moisture conditions. Prefers wet soils.**

Northwest Territory Sedge
(Carex utriculata)

Where to Plant: **Toe and Bank Zones**
Plant Type: **Grass Family**
Growth Rate: **Moderate**
Growth Form: **Rhizomatous**
Mature Height: **3.5 feet**
Lifespan: **Moderate**
Adapted to: **Medium and Fine Textured Soils**
Minimum Rooting Depth: **8"**
Anaerobic Tolerance: **High**
Drought Tolerance: **Low**
Moisture Use: **High**
Shade Tolerance: **Intolerant**
Salinity Tolerance: **Low**
Cold Tolerance: **-43 ºF**
Propagated by: **Seed, Sprigs**
Seedling Vigor: **Low**
Vegetative Spread Rate: **Slow**
Note: **Provides wildlife food and cover. Moderately tolerant to alkaline soils. Excellent for creating overhanging banks on streams. May spread across narrow, slow flowing streams and restrict stream flow.**

Thickspike Wheatgrass
(Elymus lanceolatus lanceolatus)

Where to Plant: **Transition and Upland Zones**
Plant Type: **Grass Family**
Growth Rate: **Rapid**
Growth Form: **Rhizomatous**
Mature Height: **1.8 feet**
Lifespan: **Long**
Adapted to: **Medium and Fine Textured Soils**
Minimum Rooting Depth: **18"**
Anaerobic Tolerance: **Low**
Drought Tolerance: **High**
Moisture Use: **Medium**
Shade Tolerance: **Intolerant**
Salinity Tolerance: **High**
Cold Tolerance: **-38 ºF**
Propagated by: **Seed**
Seedling Vigor: **High**
Vegetative Spread Rate: **Rapid**
Note: **Provides wildlife food and cover mostly in the drier areas along upper portions of riparian areas. Varieties: Schwendimar, Bannock and Critana.**

Photo Credits

All photographs were taken by Dean White, Lincoln County Conservation District (LCCD), within the Lincoln County portion of Water Resource Inventory Area 43 (WRIA 43, Upper Crab Creek/Wilson Creek Watershed). A Kodak DC290 digital camera was used to take the photographs. All text accompanying the photos was compiled by Dean White, LCCD.

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* This document is also available on the Internet at <http://soils.usda.gov/technical/manual/>

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