

A close-up photograph of several willow catkins (cotton-like flower clusters) on a dark brown branch. The catkins are covered in fine, greyish-white hairs. The background is a soft, out-of-focus natural setting with green and brown tones.

Utilizing the Proper Riparian and Wetland Plant Materials for Colorado

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Below 6,500 feet Eastern Slope

I. Plant Communities:

A. Below 6,500 ft. Eastern Slope:

1. Emergent:

a. Graminoid

Schoenoplectus acutus/lacustris

(hardstem/softstem bulrush)

Schoenoplectus pungens

(American threesquare)

Carex nebrascensis (Nebraska sedge)

Eleocharis palustris (creeping spikerush)

b. Herbaceous Dicot (forb)

Sparganium eurycarpum

(American burreed)

Sagittaria latifolia (broadleaf arrowhead)

Triglochin maritimum (arrowgrass)

I. Plant Communities:

A. Below 6,500 ft. Eastern Slope:

2. Riparian/Wet Meadow:

a. Graminoid

Carex nebrascensis (Nebraska sedge)

Carex lanuginosa (wooly sedge)

Carex emoryi (Emorys sedge)

Carex bebbii (Bebbs sedge)

Juncus arcticus (arctic rush)

Spartina pectinata (prairie cordgrass)

Beckmania syzigachne

(American sloughgrass)

b. Herbaceous Dicot (forb)

Iris missouriensis (Rocky Mt. iris)

Solidago canadensis (goldenrod)

Triglochin maritimum (arrowgrass)

Helianthus nutallii (Nuttall's sunflower)

I. Plant Communities:

A. Below 6,500 ft. Eastern Slope:

2. Riparian/Wet Meadow:

c. Woody

Salix exigua (sandbar/streambank/
coyote willow)

Salix lucida / *S. lasiandra*
(whiplash willow)

Salix irrorata (bluestem willow)

Salix amygdaloides (peachleaf willow)

Populus deltoides ssp. monilifera
(plains cottonwood)

Betula occidentalis (Western river birch)









I. Plant Communities:

A. Below 6,500 ft. Eastern Slope:

3. Transitional:

a. Graminoid

Elymus lanceolatus ssp. *psammophilus*
(streambank wheatgrass)

Poa palustris (fowl bluegrass)

Pascopyron smithii (western wheatgrass)

Nassella viridula (green needlegrass)

b. Herbaceous dicot (forb)

Solidago canadensis (goldenrod)

Sisyrinchium demissum

(alkali blue-eyed grass)

Campanula rotundifolia (harebell)

I. Plant Communities:

A. Below 6,500 ft. Eastern Slope:

3. Transitional:

c. Woody

Celtis laevigata var. laevigata

(netleaf hackberry)

Rhus trilobata (threeleaf sumac)

Prunus americana (American plum)

Prunus virginiana (chokecherry)

Ribes aureum (golden currant)



Below 6,500 feet Western Slope

I. Plant Communities:

B. Below 6,500 ft. Western Slope:

1. Emergent:

a. Graminoid

Schoenoplectus acutus/lacustris

(hardstem/softstem bulrush)

Schoenoplectus pungens

(American threesquare)

Bolboschoenus maritimus (alkali bulrush)

Carex nebrascensis (Nebraska sedge)

Eleocharis palustris (creeping spikerush)

b. Herbaceous Dicot (forb)

Sparganium eurycarpum

(American burreed)

Sagittaria latifolia (broadleaf arrowhead)

Triglochin maritimum (arrowgrass)

I. Plant Communities:

B. Below 6,500 ft. Western Slope:

2. Riparian/Wet Meadow:

a. Graminoid

Carex nebrascensis (Nebraska sedge)

Carex lanuginosa (wooly sedge)

Juncus ensifolius (threestamen rush)

Juncus torreyi (torreys rush)

Juncus arcticus (arctic rush)

Distichilis spicata (inland saltgrass)

b. Herbaceous Dicot (forb)

Iris missouriensis (Rocky Mt. iris)

Solidago canadensis (goldenrod)

Triglochin maritimum (arrowgrass)

Helianthus nutallii (Nuttall's sunflower)

I. Plant Communities:

B. Below 6,500 ft. Western Slope:

2. Riparian/Wet Meadow:

c. Woody

Salix exigua (sandbar/streambank/
coyote willow)

Salix lucida / *S. lasiandra*
(whiplash willow)

Salix lutea / *S. eriocephala* var. *ligulifolia*
(yellow / strapleaf willow)

Populus fremontii
(Fremont cottonwood)

I. Plant Communities:

B. Below 6,500 ft. Western Slope:

3. Transitional:

a. Graminoid

Elymus lanceolatus ssp. *psammophilus*
(streambank wheatgrass)

Poa palustris (fowl bluegrass)

Pascopyron smithii (western wheatgrass)

b. Herbaceous dicot (forb)

Solidago canadensis (goldenrod)

Sisyrinchium demissum

(alkali blue-eyed grass)

Campanula rotundifolia (harebell)

I. Plant Communities:

B. Below 6,500 ft. Western Slope:

3. Transitional:

c. Woody

Shepherdia argentea (silver buffaloberry)

Rhus trilobata (threeleaf sumac)

Ribes aureum / *R. americanum*

(golden / American currant)

Prunus virginiana (chokecherry)

Acer negundo (boxelder)

Rosa woodsii (woods rose)



Between 6,500 ft. to 9,000 ft.



I. Plant Communities:

C. Between 6,500 ft. to 9,000 ft.

1. Emergent:

a. Graminoid

Carex utriculata (beaked sedge)

Carex aquatilis (water sedge)

Eleocharis palustris (creeping spikerush)

Eleocharis macrostachya

(pale spikerush)

b. Herbaceous Dicot (forb)

Iris missouriensis (Rocky Mt iris)

Heracleum maximum

(common cowparsnip)

Mimulus guttatus

(common monkeyflower)

I. Plant Communities:

C. Between 6,500 ft. to 9,000 ft.:

2. Riparian/Wet Meadow:

a. Graminoid

Carex nebrascensis (Nebraska sedge)

Carex lanuginosa (wooly sedge)

Carex microptera (smallwinged sedge)

Juncus torreyi (torreys rush)

Juncus saximontanus (Rocky Mt. rush)

Deschampsia caespitosa

(tufted hairgrass)

b. Herbaceous Dicot (forb)

Iris missouriensis (Rocky Mt. iris)

Geranium richardsonii

(Richardsons geranium)

Geum macrophyllum (largeleaf avens)

Delphinium barbeyi (subalpine larkspur)

I. Plant Communities:

C. Between 6,500 ft. to 9,000 ft.:

2. Riparian/Wet Meadow:

c. Woody

Salix exigua (sandbar/streambank/
coyote willow)

Salix lucida / *S. lasiandra*
(whiplash willow)

Salix drummondiana (Drummonds willow)

Salix monticola (Rocky Mt. willow)

Salix geyeriana (Geyers willow)

Salix bebbiana (Bebbs willow)

Populus angustifolia
(narrowleaf cottonwood)

Betula occidentalis (Western river birch)

Alnus incana ssp. *tenuifolia*
(thinleaf alder)



















I. Plant Communities:

C. Between 6,500 ft. to 9,000 ft.:

3. Transitional:

a. Graminoid

Juncus arcticus (Arctic rush)

Deschampsia caespitosa

(tufted hairgrass)

Carex microptera (smallwinged sedge)

Calamagrostis canadensis

(bluejoint reedgrass)

b. Herbaceous dicot (forb)

Geum triflorum (old man's whiskers)

Conioselenium scopulorum

(wild parsely)

Campanula rotundifolia (harebell)

I. Plant Communities:

C. Between 6,500 ft. to 9,000 ft.:

3. Transitional:

c. Woody

Lonicera involucrata

(twinberry honeysuckle)

Cornus sericea (redosier dogwood)

Ribes inermis / *R. lacustre*

(whitestem gooseberry / spiny currant)

Prunus virginiana (chokecherry)

Rosa woodsii (woods rose)

Rhus trilobata (threeleaf sumac)

Salix scouleriana (Scoulers willow)

Pentaphylloides floribunda

(shrubby cinquefoil)



Above 9,000 ft



I. Plant Communities:

D. Above 9,000 ft.

1. Emergent:

a. Graminoid

Carex utriculata (beaked sedge)

Carex aquatilis (water sedge)

Juncus mertensianus

(Mertens rush)

Juncus hallii

(Halls rush)

b. Herbaceous Dicot (forb)

Caltha leptcephala (marsh marigold)

Pedicularis groelandica

elephanthead lousewort)

Mimulus tilingii

(alpine monkeyflower)

I. Plant Communities:

D. Above 9,000 ft.:

2. Riparian/Wet Meadow:

a. Graminoid

Carex aquatilis (water sedge)

Carex simulata (analogue sedge)

Carex canescens (silvery sedge)

Carex saximontana (Rocky Mt. sedge)

Juncus mertensianus (Mertens rush)

Deschampsia caespitosa

(tufted hairgrass)

b. Herbaceous Dicot (forb)

Caltha leptocephala (marsh marigold)

Primula parryi (Parrys primrose)

Pedicularis groelendica

(elphanthead lousewort)

I. Plant Communities:

D. Above 9,000 ft.:

2. Riparian/Wet Meadow:

c. Woody

Salix planifolia (planeleaf willow)

Salix glauca (gray / subalpine willow)

Salix wolfii (Wolfs willow)

Salix brachycarpa (barrenground willow)

Betula nana (bog birch)









I. Plant Communities:

D. Above 9,000 ft.:

3. Transitional:

a. Graminoid

Trisetum spicatum (spike trisetum)

Calamagrostis strica

(northern reedgrass)

Carex microptera (smallwinged sedge)

Phleum alpinum (alpine timothy)

b. Herbaceous dicot (forb)

Castilleja sulfurea (sulphur paintbrush)

Penstemon whippleanus

(Whipples penstemon)

Aquilegia saximontana (alpine columbine)

Polygonum bistortoides (alpine bistort)

Rodiola intergrifolia (kings crown)

I. Plant Communities:

D. Above 9,000 ft.:

3. Transitional:

c. Woody

Betula nana (bog birch)

Pentaphylloides floribunda

(shrubby cinquefoil)

Ribes montigenum (alpine currant)

Prunus pensylvanica (pin cherry)

Krumholtz species

II. Propagule Choice:

A. Seed:

- 1. Less expensive than establishment by vegetative means, both in terms of plant materials and labor.**
- 2. Easier/Less expensive to store than vegetative propagules.**
- 3. Can usually store for longer time period than vegetative propagules.**
 - a. On average can store grass seed for up to 5 years, forb seed from up to 1 to 5 years and woody seed from 5 to 10 years. Many exceptions, however.**

II. Propagule Choice:

A. Seed:

- 4. In terms of heterozygosity and phenology, more variable than vegetative propagules.**
- 5. Less likely to work on highly stressful sites.**
- 6. Both in terms of germination and growth rate, slower to establish than vegetative materials.**
- 7. Much more susceptible to being out-competed by existing vegetation or weeds.**
- 8. Offers little protection against erosion, hence may need to be combined with other methods of biostabilization (e.g. erosion control fabric)**



II. Propagule Choice:

B. Dormant Woody Cuttings:

- 1. Includes poles, wattles/fascines, whips, brush layering, etc.**
- 2. Must be collected while dormant. Spring collection works better than fall.**
- 3. Must either be planted immediately or stored.**
- 4. Storage must be under cool, moist conditions out of direct sun, and shouldn't be for more than 30 days (60 days max under cooling).**
- 5. Material cost is relatively inexpensive. Most expensive part is labor to collect, process, and install.**

II. Propagule Choice:

B. Dormant Woody Cuttings:

- 6. Often requires replanting. Approximately 30% survival is common.**
- 7. If mobilization, labor, and replanting costs are considered, can be more expensive than using containerized stock.**
- 8. Should be used in combination with other techniques such as seed and containerized and / or longstem planting stock.**
- 9. Must schedule around spring run-off. Planting on the receding limb of the hydrograph (after run-off) works best, but may be difficult because of short window for collection and storage.**





II. Propagule Choice:

C. Containerized Stock:

- 1. Initial cost is higher than establishment by seed or dormant cuttings. However, if mobilization, labor, and replanting costs are considered, often less expensive than establishment by seed or dormant cuttings.**
- 2. If site-specific germplasm is required, will take longer to produce than dormant cuttings**
- 3. In combination with longstem materials, represents the best way to reclaim highly erosive areas.**
- 4. Little to no specialized equipment is required for installation, but installation is slower than for dormant cuttings.**

II. Propagule Choice:

C. Containerized Stock:

- 5. Transportation costs are higher than for dormant vegetative cuttings or seed.**
- 6. Can be established throughout the growing season, or while dormant, if the ground is not frozen. Accordingly, can plant on the receding limb of the hydrograph (e.g. after run-off).**







II. Propagule Choice:

D. Longstem Plantings:

- 1. Represents plant materials that are typified by adventitious tissue, tall pots, and elongated stems.
 - a. Adventitious tissue = ability to selectively form root or shoot.****
- 2. Elongated stems are 6 – 10 feet tall. Planted such that all but the upper portion of leaf crown is buried and such that the roots intersect the stagnant water table.**
- 3. Roots form at bud-nodes along the stem, allowing deep and rapid establishment.**

II. Propagule Choice:

D. Longstem Plantings:

- 4. Requires installation of monitoring wells in order to note the stagnant water level.**
 - a. Adventitious tissue = ability to selectively form root or shoot.**
- 5. Requires specialized equipment such as stingers and/or hydraulic presses.**
- 6. Allows for deep planting concurrent with the falling limb of the hydrograph, hence after the occurrence of peak flow.**
- 7. Deep planting allows for better resiliency to scour and soil loss.**

II. Propagule Choice:

D. Longstem Plantings:

- 8. While more expensive than dormant vegetative cuttings and traditional containerized stock, has improved survival and the ability to survive without subsequent irrigation in xeric areas.**
- 9. Should be used in concert with seeding, dormant vegetative cuttings, or traditional containerized materials.**









