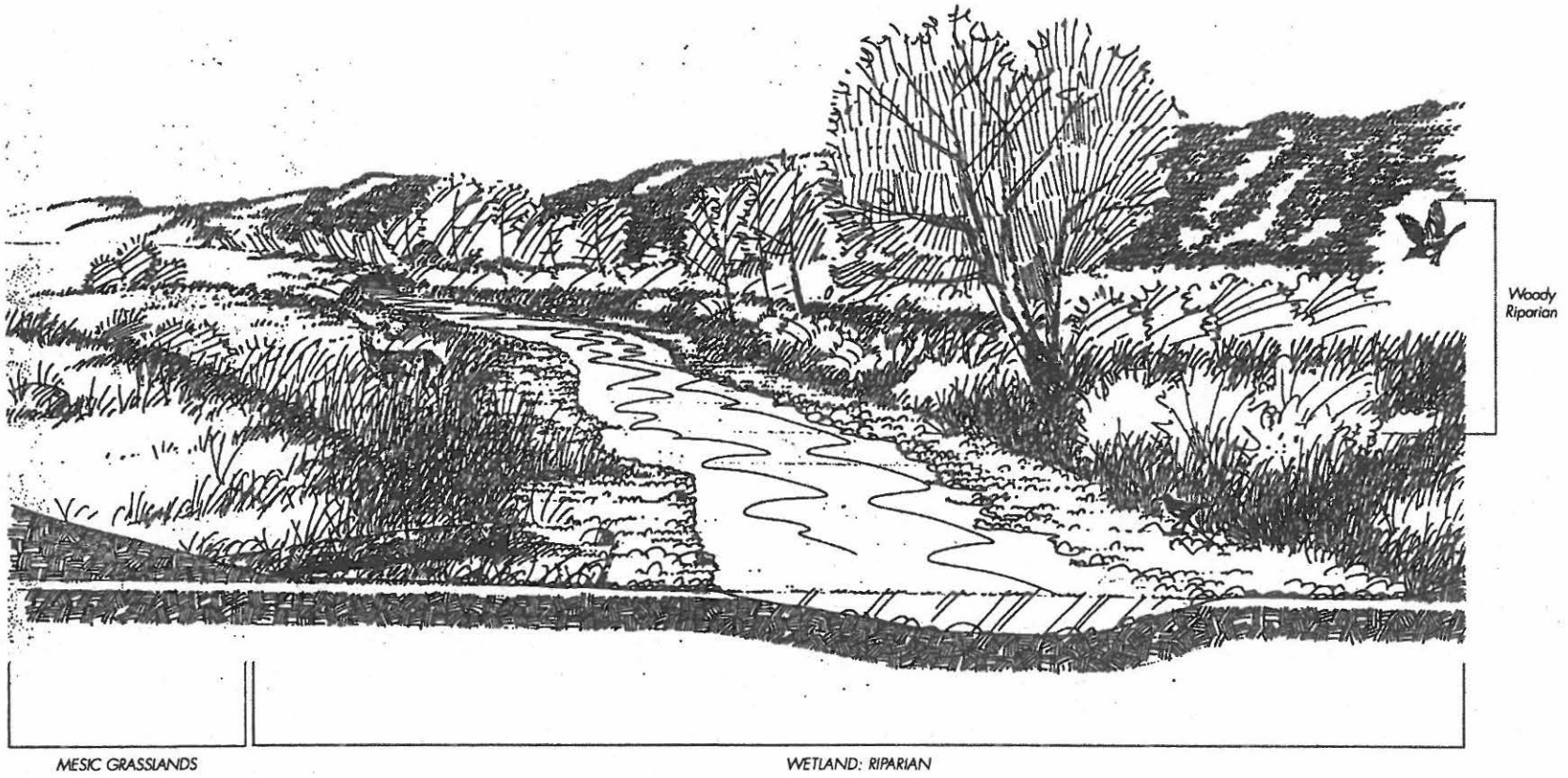
City of Boulder

Wetlands Protection Program Best Management Practices: Revegetation Rules



Prepared by ERO Resources Corporation
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City of Boulder Wetlands Protection Program Revegetation Rules

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Acknowledgements

These rules were written with the help of many experts in the fields of soil science, ecology, horticulture, weed science, and other disciplines involved with restoring native habitats. The bibliography can be used for further reading on the subject. Botanical drawings by ERO staff and illustrations from several sources were used including—

Hitchcock, A. 1971. Manual of the Grasses of the United States. Dover.

Britton, N. and Brown, A. 1970. An Illustrated Flora of the Northern United States and Canada. Dover.

Lackschewetz, K. 1991. Vascular Plants of West-Central Montana — Identification Guidebook. U.S. Forest Service.

Wasser, C. 1982. Ecology and Culture of Selected Species Useful in Revegetating Disturbed Lands in the West. U.S. Fish and Wildlife Service.

Table of Contents

Introduction

Use and Application

The City of Boulder Best Management Practices: Revegetation Rules provides a regulatory framework for applicant to use in evaluating their sites and restoring wetland, riparian, and adjacent habitats when avoidance is not possible. The rules outline considerations in designing and implementing a wetland revegetation project.

The rules set forth in this document apply to all wetland regulated areas, including all wetlands mapped within Boulder's city limits as well as all wetlands on city-owned lands, and all city activities affecting wetlands regardless of location. Maps showing the regulatory boundaries of wetlands within the city are available from the Mapping and Records Office in the Department of Public Works.

The rules set forth in this document are to be used in conjunction with the City of Boulder Wetlands Protection Program Best Management Practices (BMP's) and other city documents included in the list to the right. The first volume of BMP's was adopted by the city manager as a rule in July 1995. BMP's are required in order to proceed pursuant to Section 9-12-5(c) and (d), B.R.C. 1981. In addition, BMP's may be utilized pursuant to other sections of the ordinance including conditions in wetland permits, Section 9-12-9, B.R.C. 1981, or as part of a mitigation plan, Section 9-12-10, B.R.C. 1981.

Revegetating with Natives

These rules focus on the establishment of native wetland, riparian and upland vegetation. Restoration and revegetation may occur in the wetland, surrounding buffer, or both; hence; the rules address a range of habitats.

In its Application Materials for Compensatory Mitigation Plans, the city specifies that native plant materials from local sources will be used for wetland mitigation and revegetation. The rules focus on plant materials native to the Boulder region. Although some of the native plant materials presented currently are not commercially available, nurseries may carry them in the future. Natives are more desirable than non-natives because native plants typically require little long-term maintenance and are adapted to local conditions. Native plants are more beneficial to wildlife than non-native species because the native animals are adapted to local vegetation. Additionally, many non-native species become nuisances that are difficult to control and, as they spread, they replace desirable native species. These rules also emphasize the use of commercially available native plant materials for revegetation because commercially available stock is easier to specify in contract documents.

The Boulder Revegetation Rules focus more specifically on the restoration and revegetation of wetlands and adjacent areas disturbed by construction activities, than the creation of new wetland habitats. However, plant materials and methods described in the rules have applicability to the creation of new wetland habitats as well.

The efficiency and potential for success in using means other than commercially available seeds

- Advanced Identification of Wetlands in the City of Boulder Comprehensive Planning Area
- City of Boulder Wetlands Mitigation Guidelines and Wetlands Mitigation Design Standards and Specifications
- City of Boulder Wetlands Protection Program Best Management Practices. Management techniques that must be integrated with revegetation plans to successfully establish vegetation are outlined as follows:

Seedbed preparation	p. 63
Seeding	p. 65
Mulching	p. 66
Bank stabilization	pp. 43-60
Erosion control	pp. 16-18, 75-86

- City of Boulder Wetlands Protection Ordinance Guidance for Applicants
- Application Materials for Compensatory Mitigation Plans
- Plan Requirements for Wetlands Permits (Attachment L)
- Wetlands Permit Criteria (Attachment K)
- City of Boulder Wetlands Ordinance No. 5521, which regulates activities that occur in a wetland and its buffer area (typically 25 feet to 50 feet surrounding the wetland), collectively referred to as the regulated area.

3. **Management** — For a revegetation project to be successful, it cannot be planted and then abandoned. Weed and erosion control, watering, remedial planting, and pedestrian access need to be addressed for two to five growing seasons, depending on the potential for revegetation and restoration success. Criteria for determining the success of a revegetation project should be included in the revegetation plans. A wetland may be determined successful if wetland vegetation (wetland indicator rating of FAC or better) and hydrology are found to be stable. One standard used for quanifying success is for 75 percent of the area to be covered by species with a wetland rating of Facultative or wetter. A revegetation project may be determined successful if 80 percent of the trees and shrubs planted survive for three growing season.

   City of Boulder wetland regulations, however, specify that a permit applicant may be responsible for the implementation of a wetland mitigation plan for up to five years from the time of construction in order to insure success of the project.

Designing and Implementing a Revegetation Project

The following steps will assist you in successfully designing and maintaining a native plant landscape:

Step 1 — Site Characterizations: Before construction is started, conduct a site analysis to determine the water, landscape, soils, and other important characteristics. Plant species have varying requirements and tolerances relative to soil moisture, flooding, light, soil texture, and salinity. Answer the questions in Table 1 to help you analyze your site.

Step 2 — Set Goals: After the site conditions and habitat types are known, determine the project goals. These may include:

- Returning a wetland and its associated buffer zone to the same functional value as before the disturbance. (This is a requirement of the city of Boulder Wetland Permit Process.) Functional Values are ratings assigned to the beneficial roles served by the wetlands (and to a more limited extent, their associated buffer zones). These functions include (but are not limited to) storage of floodwater, ground water recharge and discharge, protection of water quality by sediment trapping and shoreline anchoring, habitat for plants and animals. For most wetlands in the city of Boulder, these functional values have already been determined and the information is available in the Department of Public Works.
- Open Space Goals: If this project is within or adjacent to an Open Space Area, then the requirements of that particular area needs to be considered in the plan.
- Aesthetic Goals: For example, when revegetating a buffer zone next to a bike path, the goal may be to plant trees and shrubs that will provide shade and beauty along the path.
- Practical Goals: The project, for example, may include revegetating the upper banks of an urban drainage. In the past, this site may have been mowed for safety reasons and would continue to be mowed in the future. The goal for this project may be to plant grasses that can withstand frequent mowing.

Table 1: Questions to Analyze the Site

- Regulatory Division: Is the site in the Buffer Zone, Wetland Zone, or both?
- Hydrology: Is the site along a stream? Is streamflow permanent or intermittent? Is the site hydrology understood? If so, how far below ground level is the water table? Does the water table level fluctuate seasonally, and if so by how much?
- Topography: Is the site a depression with gentle side slopes, a steep, incised stream channel, a shallow stream channel, or a combination of several different types?
- Soils: What is the soil's texture (clayey, loam, sandy)? Is the soil alkaline or saline?
- Vegetation: What kind of vegetation currently exists on the site — trees, shrubs, only herbaceous vegetation? What are the species? Are these native or introduced?
- Elevational Zone: Is the site along the foothills or on the plains? (In the Boulder area, foothills begin at the base of mountains around 5,600'; plains extend from the bottom of foothills below about 5,600'.)
- Management Concerns: Are there existing or potential problems that need to be addressed in the design of the plan (e.g., weeds, erosion, heavy pedestrian traffic)?
- Future Conditions: How will site conditions change? Will development in the next 10 years add more stormwater runoff and drainage?

Table 2. Use the site analysis information to determine the appropriate habitat type or types for the site as follows:

Regulatory division + Hydrology + Topography + Soils = Habitat type

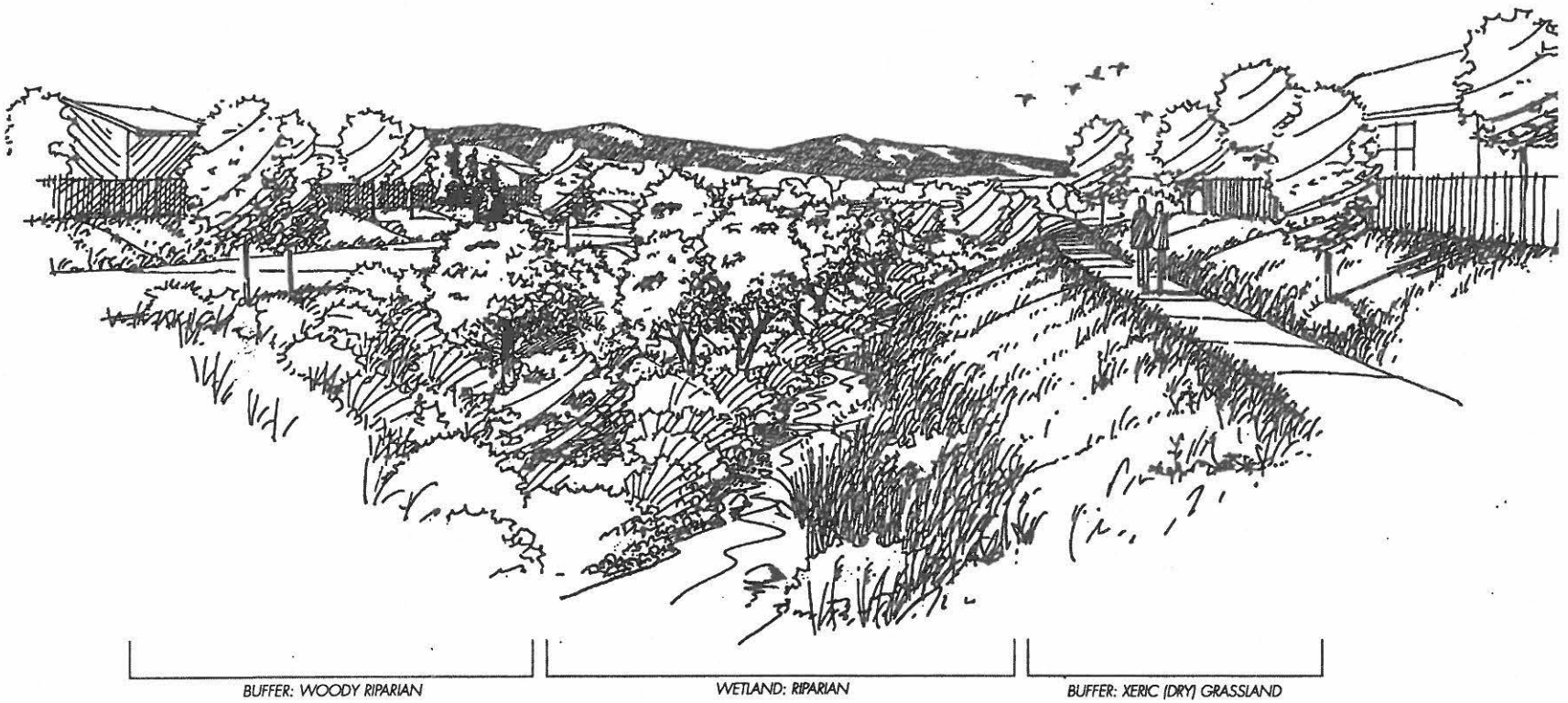
Regulatory Division	Hydrology	Topography	Soils	Habitat Type
Wetland	Adjacent to running water, either intermittent or permanent. The soils are saturated for at least a portion of the year.	At the bottom of the drainage.	Varied	**Wetland: Riparian**
Wetland	The water table is within 1 foot of the surface for a portion of the growing season.	Depressions. Along the margins of ponds	Varied, includes saline and alkaline flats	**Wetland: High Water Table**
Wetland	Standing water varying from a few inches to 3 feet	Ponds, Reservoirs	Varied, includes saline and alkaline flats	**Wetland: Permanent Standing Water**
Buffer Zone	Adjacent to running water, either intermittent or permanent. Soils not saturated for a portion of the growing season.	Upper banks of drainages	Varied	**Buffer Zone: Woody Riparian**
Buffer Zone	Moist soils that are not saturated for a portion of the growing season.	Upper banks of drainages. Upland areas. Shallow swales without saturated soils.	Deep loams that range in texture from cobbly to clayey	**Buffer Zone: Mesic Grasslands**
Buffer Zone	Dry, with well-drained soils	Upland	Varied, from sandy to clayey loams	**Buffer Zone: Xeric Grasslands**

[3]*Note on scientific names - The scientific names of many of these species currently are being revised. In order to make this document easy to use, the more commonly printed scientific name is printed first, with the revised scientific name (Weber and Wittman 1996) in parenthesis.*

Habitat Descriptions

WETLAND: PERMANENT STANDING WATER

WETLAND: HIGH WATER TABLE


BUFFER: WOODY RIPARIAN
WETLAND: RIPARIAN
BUFFER: XERIC (DRY) GRASSLAND

WR Wetland: Riparian

Description

Several intermittent or perennial streams flow through the City of Boulder. Flows and stream stage fluctuate widely during the year from several feet above the streambed during spring and after thunderstorms to a small trickle or even no water in the fall and winter. Some of the bigger streams, such as Boulder Creek, have a relatively large flow of water year-round.

The Wetland Riparian habitat occurs in the bottoms of drainages adjacent to streams. Along shallower stream valleys, especially on the eastern plains, wide swatches of sandbar willows grow within the flood plain. These plants grow well in low-lying areas next to the streams because they can tolerate periodic inundation by high velocity flood waters. In narrower shady channels, a dense shrub layer of willows, currants, and others grow under a canopy of cottonwoods, alders and other trees.

In more open areas, tall grasses such as switchgrass and prairie cordgrass dominate streambanks. These rhizomatous grasses create thick sods that anchor the creeks.

In general, vegetation in the riparian areas differ between the canyons of the foothills and the streams of the plains. The cooler, moister foothills are shrubbier — containing a greater diversity of shrubs and small trees that do not occur on the plains. On the plains, the streams typically contain patches of grasses between wide swaths of sandbar willows and other shrubs with scattered patches of cottonwoods (see front cover).

Historically, Colorado streams meandered across the landscape, changing course over time. Today, this natural meandering may still occur in rural areas; however, in urban as well as some rural areas, streams have been channelized, creating straight, steep-sided streambeds (see page facing the introduction).

Cottonwoods, willows, and a wide variety of shrubs and herbaceous species grow in wetlands along naturally meandering streams. In channelized streams, wetlands tend to be narrower because of the straight banks. Native trees such as cottonwoods do not generally regenerate in straight channels.

Habitat Association

The Wetland: Riparian habitat forms the lower banks of permanent and intermittent drainages. On the banks above these wetlands, communities of Buffer Zone: Woody Riparian, Buffer Zone: Mesic Grassland, and Buffer Zone: Xeric Grassland can occur.

Wetland: Riparian Habitat Native Plant Palette, continued

Grasses/Grass-like		
Alkali Sacaton	*Sporobolus airoides*	P
Bluestem, Big	*Andropogon gerardii*	P
Cordgrass, Prairie	*Spartina pectinata*	P
Indiangrass, Yellow	*Sorghastrum nutans (avenaceum)*	P
Mannagrass	*Glyceria striata*	P, F
Rush, Colorado	*Juncus confusus*	P, F
Switchgrass	*Panicum virgatum*	P, F
Wheatgrass, Slender	*Agropyron trachycaulum (Elymus trachycaulus)*	P
Wheatgrass, Western	*Agropyron (Pascopyrum)smithii*	P, F
Wildrye, Canada or Nodding	*Elymus canadensis*	P, F
Forbs		
Milkweed, Swamp	*Asclepias incarnata*	P, F

[1]P = Plains; F = Foothills

Topography
The Wetland: Riparian habitat occurs along stream banks. On steep streambanks, this habitat typically is limited to the streambank's lower portion, which is subject to periodic flooding or has a shallow water table associated with the drainage.

Hydrology
The Wetland: Riparian habitat requires shallow ground water levels that typically occur about 12 to 18 inches below the ground surface during most of the early portion of the growing season. Many of the dominant trees and shrubs, such as peachleaf willow and sandbar willows, require the water table to be at root level for most of the growing season.

Soils
Soils range from thick clayey loams to gravelly alluvium. Many of these soils are unstable and susceptible to erosion.

Management Concerns, continued

Trees	
Elm, Siberian	*Ulmus pumila* — Escaped cultivation and has colonized roadsides, and streambanks. Can be used as an indicator to distinguish between the upper and lower riparian zone; it does not tolerate frequent or prolonged inundation or saturated soils.
Russian Olive	*Elaeagnus angustifolia — Threatens riparian corridors by becoming the dominant tree displacing cottonwoods and other native vegetation. Seed commonly dispersed by birds.*
Willow, crack	*Salix fragilis* — Introduced species that competes with native trees along riparian corridors. Very common in the Boulder area.
Willow, white	*Salix alba var. vitellina* — Displaces native willows and cottonwoods in riparian corridors.

• **Erosion Control**: As discussed in Soils, above, erosion can be a severe problem in these drainages, especially in the gravelly soils. Steep banks may require using geotextile fabrics, bioengineering techniques or, in some instances, structural solutions. Bank stabilization methods should be incorporated with the establishment of vegetation. For more information, refer to the City of Boulder Wetland Protection Program BMPs. If erosion results in the loss of vegetative cover, the area should be stabilized and revegetated with the appropriate species as soon as possible. Anchoring the bank with sandbar willow and rhizomatous grasses can help stabilize banks and reduce erosion.

• **Fertilization**: Fertilizers are not recommended in the drainages or on any other wetland restoration/revegetation project as they can leach into the water supply and are not needed to support native vegetation.

Wetland: High Water Table Native Plant Palette

Common Name	Scientific Name	Zone[1]
Grasses		
Alkali grass	*Puccinellia nuttalliana (airoides)*	P
Alkali sacaton	*Sporobolus airoides*	P
Arrowweed	*Triglochin maritimum*	P
Bluestem, Big	*Andropogon gerardii*	P
Bulrush, alkali	*Scirpus maritimus (Bolboshoenus maritimus* ssp. *paludosus)*	P, F
Bulrush, Hard-stem	*Scirpus acutus (Schoenplectus lacustris* ssp. *acutus)*	P
Bulrush, 3-square or Olney Threesquare	*Scirpus americanus (Schoenoplectus pungens)*	P, F
Bulrush, small fruit	*Scirpus microcarpus*	P, F
Cattail, Broadleaf	*Typha latifolia*	P, F
Cordgrass, prairie	*Spartina pectinata*	P, F
Mannagrass	*Glyceria striata*	P, F
Rush, Baltic or Arctic	*Juncus balticus (arcticus)*	P, F
Rush, Colorado	*Juncus confusus*	P, F
Saltgrass, Inland	*Distichlis spicata (stricta)*	P
Sedge, Nebraska	*Carex nebrascensis*	P, F
Sedge, Woolly	*Carex lanuginosa*	P, F
Spikerush, creeping	*Eleocharis palustris*	P, F
Spikerush, needle	*Eleocharis acicularis*	P, F
Switchgrass	*Panicum virgatum*	P, F
Wheatgrass, Slender	*Agropyron trachycaulum*	P, F
Wheatgrass, Western	*Agropyron (Pascopyrum) smithii*	P,F

[1]P = Plains; F = Foothills

Highly Recommended Native Species for Wetland: High Water Table

Common Name	Desirable Qualities
Alkali Sacaton	Will grow on alkaline wet soils.
Bulrush, Hardstem and Softstem	Can be established in shallow marshes. Good alternative to cattail.
Cordgrass, Prairie	Forms a dense sod that stabilizes soils. Alkaline tolerant.
Rush, Baltic	Tolerates a wide range of water regimes. Alkaline tolerant.
Sedge, Nebraska	Useful in open areas with a high water table near the surface for most of the growing season.
Threesquare or Olney Threesquare	Grows in areas of moderately fluctuating water tables. Tolerates alkaline and saline soils.

Habitat

General Seed Mix

Because of the wide variety of plant communities found in this habitat, a general seed mix is not recommended.

Topography

This community occurs in shallow depressions, irrigated hay meadows, flood plains, and next to streambanks and lakeshores.

Hydrology

The water table is within 1 foot or less of the surface for at least a portion of the growing season. Soils can be temporarily inundated but not have permanently standing water. Runoff and irrigation also help support many of these wetlands.

Soils

The soils of this community range from clay frequently associated with threesquare bulrush and baltic rush communities, to soils with organic surface horizons where sedges, prairie cordgrass, and cattails grow. Saline and alkaline clay soils form in low areas where high water tables dissolve salts and sodium and evaporation and capillary action carry the salts near the soil surface.

WSW Wetland: Permanent Standing Water

Description

This habitat type occurs on the shallow edges of ponds, and reservoirs (see illustration, page 16). The vegetation of this community is characterized as rooted in the soil with the leaves and flowers emerging from the water. Toward the middle of the pond, the water gets too deep to support emergent vegetation. Beyond this point, the vegetation consists of submerged or floating plants (this community type is not addressed in these revegetation rules), or open water. At the shallow edges of the ponds, the water levels may fluctuate from inundated to occasionally muddy shorelines that can merge with the Wetland: High Water Table habitat (previously described).

Cattails, bulrushes, and sedges grow in small to large patches along these shorelines, sometimes covering the entire shallow shelf of a pond or reservoir. Broad-leaved forbs such as arrowhead, smartweed, and water plantain may grow in patches between and around the taller plants, especially at the shallower end of the community. In alkaline and saline waters, alkali bulrush predominates. Because cattails are very tolerant of nutrient loading, they flourish in ponds with poor quality urban runoff. This habitat type is generally important in helping filter and trap sediments and excess nutrients, especially in pond and reservoir inlets and outlets.

Associated Habitats: Wetland: Permanent Standing Water may merge with Wetland: High Water Table habitats along shorelines of ponds and lakes.

Highly Recommended Native Species for Wetland: Permanent Standing

Common Name	Desirable Qualities
Arrowhead	Attractive flowering plant is useful in contrast with the taller, glass-like plants of this habitat.
Bulrush, alkali	Grows in alkaline and salty soils in up to 6" of standing water
Bulrush, Hard-stem	Grows in up to 3' of standing water. Stabilizes the shoreline. A good substitute for cattails.
Sedge, Nebraska	Rhizomatous. Can spread rapidly once established.
Sedge, Water	Tolerates pollution. Valuable for erosion control.

Water

Seed Mix

No seed mix is recommended for this community because most of these species are best established from container stock or transplanted plugs.

Topography

This community typically occurs on pond and reservoir shorelines.

Hydrology

This community is associated with standing water varying from a few inches to 3 feet above ground. Water level fluctuations are common.

Soils

Developed soils of this habitat type often have a surface organic horizon from decaying plant material. Many Boulder area ponds and reservoirs are alkaline or saline. In urban areas, these inundated areas may collect pollutants and sediments.

BWR Buffer Zone: Woody Riparian

Description

In the buffer zone above drainages, cottonwoods and a variety of other trees and shrubs grow on elevated terraces and streambanks (see front cover, and page facing the introduction). In moist areas, such as steep north-facing slopes, dense patches of chokecherry, American plum, and currants can grow along the banks shaded by taller trees. On drier slopes and terraces, grasses such as slender and western wheatgrasses grow below widely spaced cottonwoods and scattered shrubs.

The shady, moister canyons of the foothills tend to be more densely vegetated with woody species than the more open streams of the plains. Many woody species such as beaked hazelnut, Rocky Mountain maple, and twinberry grow in the foothills around Boulder but do not occur on the plains.

Associated Habitats

The Buffer Zone: Woody Riparian occurs along the upper banks of drainages and can occur with either the Xeric Grassland or the Mesic Grassland habitats. Wetland: Riparian community occurs below the buffer zone.

Buffer Zone: Woody Riparian Native Plant Palette, continued

Vines		
Virginsbower, Western	*Clematis ligusticifolia*	P, F
Grape, River	*Vitis riparia*	F
Grasses/Grass-like		
Alkali Sacaton	*Sporobolus airoides*	P
Bluestem, Big	*Andropogon gerardii*	P
Bluestem, Little	*Schizachyrium (Andropogon)scoparium*	P
Buffalo grass	*Buchloe dactyloides*	P
Grama, Blue	*Bouteloua gracilis*	P, F
Grama, Sideoats	*Bouteloua curtipendula*	P, F
Indiangrass, Yellow	*Sorghastrum nutans (avenaceum)*	P
Needlegrass, Green	*Stipa (Nassella) viridula*	P, F
Ricegrass, Indian	*Oryzopsis hymenoides*	
Rush, Colorado	*Juncus confusus*	P, F
Switchgrass	*Panicum virgatum*	P, F
Wheatgrass, Slender	*Agropyron trachycaulum (Elymus trachycaulus)*	P
Wheatgrass, Western	*Agropyron (Pascopyron) smithii*	P, F
Wildrye, Canada or Nodding	*Elymus canadensis*	P, F
Forbs		
Milkweed, Showy	*Asclepias speciosa*	P, F
Prairieclover, Purple	*Petalostemon purpureum (Dalea purpurea)*	P

[1]P = Plains; F = Foothills

Native Seed Mix for Buffer Zone: Woody Riparian, continued

Well-Drained Gravelly Soils				
Species	Common Name	Variety	% Mix	Lbs.(PLS)/ Acre
Agropyron smithii	Western wheatgrass	Arriba	30	3.2
Bouteloua curtipendula	Sideoats grama	Vaughan	20	1.8
Bouteloua gracilis	Blue grama	Lovington	15	0.5
Buchloe dactyloides	Buffalo grass	Native	5	0.8
Oryzopsis hymenoides	Indian ricegrass	Paloma	5	0.6
Stipa comata	Needle and thread		15	2.3
Stipa viridula	Green needlegrass		10	1.0
Total			100	10.2

These general mixes are best used in open areas and for projects where the woody vegetation is just being established. For shady areas under mature trees, use more shade tolerant species such as Canada wildrye and some of the wheatgrasses.

Topography

This community occurs on the upper streambanks and elevated terraces where soils are drier and rarely flooded.

Hydrology

In the Buffer Zone: Woody Riparian, the water table is deeper than 1 foot. Trees and shrubs that require less water, such as cottonwood and chokecherry, should be planted in this zone. However, cottonwoods and other woody plants will require supplemental watering until they can grow roots long enough to tap into the water table or develop root systems that collect soil moisture to support the plants. Typically, woody vegetation will require supplemental watering for two to three growing seasons (see Wetland BMPs).

Soils

Soils range from thick clayey loams to areas of gravely alluvium. Erosion of upper stream banks and terraces can be a problem especially in more gravely areas.

To prevent the spread of these undesired plants, a critical step is to revegetate moist areas as soon as possible.

• **Erosion Control**: As discussed in Soils, above, erosion can be a severe problem in these drainages, especially in the gravelly soils. Steep banks may require using geotextile fabrics, bioengineering techniques or, in some instances, structural solutions. Bank stabilization methods should be incorporated with the establishment of vegetation. For more information, refer to the City of Boulder Wetland Protection Program BMPs. If erosion results in the loss of vegetative cover, the area should be stabilized and revegetated with the appropriate species as soon as possible. Anchoring the bank with rhizomatous grasses can help stabilize banks and reduce erosion.

• **Irrigation**: Successful establishment of grasses typically requires irrigation during the first year. Irrigation can be used to help weed control — in early spring, areas with weeds such as cheatgrass can be tilled under; in late spring the desired grass species can be planted and irrigated. Otherwise the grasses would need to be seeded early in the spring when adequate moisture is present. However, at this time cheatgrass is vigorously growing and taking moisture and nutrients from native plants.

• **Fertilization**: Fertilizers are not recommended in the drainages as they leach into the water supply and are not needed to support native vegetation.

Buffer Zone: Mesic Grassland Native Plant Palette

Common Name	Scientific Name	Zone[1]
Shrubs		
Rabbitbrush, Rubber	*Chrysothamnus nauseosus*	P, F
Rose Wood's	*Rosa woodsii*	P, F
Sagebrush, Silver	*Artemesia (Seriphidium) cana*	P, F
Snowberry, Western or Wolfberry	*Symphoricarpos occidentalis*	P, F
Grass/Grass-Like		
Alkali Sacaton	*Sporobolus airoides*	P
Bluestem, Big	*Andropogon gerardii*	P
Bluestem, Little	*Schizachyrium scoparium*	P
Grama, Blue	*Bouteloua gracilis (Chondrosum gracile)*	P, F
Grama, Sideoats	*Bouteloua curtipendula*	P, F
Indiangrass, Yellow	*Sorghastrum nutans*	P
Needlegrass, Green	*Stipa viridula*	P, F
Switchgrass	*Panicum virgatum*	P, F
Wheatgrass, Slender	*Agropyron trachycaulum*	P
Wheatgrass, Western	*Agropyron (Pascopyrum) smithii*	P, F
Wildrye, Canada	*Elymus canadensis*	P, F
Forbs		
Coneflower, Prairie or Mexican Hat	*Ratibida columnifera*	P, F
Milkweed, Showy	*Asclepias speciosa*	P, F
Prairieclover, Purple	*Petalostemon purpureum (Dalea purpurea)*	P
Sunflower, Common	*Helianthus annus*	P, F

[1]P = Plains; F = Foothills

Topography

This community occurs on sheltered upper streambanks with moist soils. It can be found on lowland flood plains and slight depressions. It also can occur on gentle slopes with gravelly soils in outwash mesas at the base of the foothills.

Hydrology

Buffer Zone: Mesic Grassland communities occur where the soils hold moisture equivalent to areas with greater than the average local rainfall. This includes flood plain meadows where the soils are moist but not saturated, and protected upper banks of drainages. The amount of extra moisture determines the plant community. This soil moisture can vary from slightly above the average rainfall to soil moisture levels equivalent to an average precipitation of 20 inches or more a year.

Soils

This community typically occurs in areas of deep loams that range in texture from cobbly sandy to clay. One interesting soil type includes the cobbly substrate found on the outwash mesas near the foothills. These porous soils allow the water to drain down to a lower level where it collects and provides more moisture to the plant then is available from direct precipitation.

Buffer Zone: Xeric Grassland

BDG

Description

Although this is not a community usually considered when discussing buffer zones and wetlands, Xeric Grasslands do grow on the upper edge of streambanks and wetlands as an extension of the dry prairie typical of the high plains of Colorado (see illustration on page 42).

Short grasses such as blue grama and buffalograss dominate large areas of the prairie especially on dry, clayey soils. Scattered throughout the short grass prairie are yucca, sages, and other shrubs. Numerous showy wildflowers such as the bright orange cowboy's delight, purple dotted gayfeather, and the white Easter daisy provide color to this grassland. Where more moisture occurs, mid grasses, such as Green needlegrass, western wheatgrass, and needle-and-thread grass, appear.

Associated Habitats

The Buffer Zone: Xeric Grassland occurs in the drier more exposed portion of the buffer zone and may occur with Mesic Grasslands and Woody Riparian communities.

Highly Recommended Native Species Buffer Zone: Xeric Grassland

Common Name	Desirable Qualities
Buffalograss	One of the dominant plants of the short grass prairie. Useful for soil stabilization, especially on dry, clay soils.
Grama, Blue	One of the dominant plants of the short grass prairie. Sod former. Useful for soil stabilization. Very drought tolerant.
Ricegrass, Indian	Very drought tolerant. Grows in dry sandy areas that are difficult to establish other plants.
Sage, fringed	Common plant on open exposed sites

Native Seed Mix for Buffer Zone: Xeric Grassland

Call the NRCS in Longmont for site-specific mixes, or use the following general mix—

Well-Drained Gravelly Soils				
Common Name	Species	Variety	% Mix	Lbs.(PLS)/Acre
Western Wheatgrass	*Agropyron smithii*	Arriba	30	3.2
Sideoats Grama	*Bouteloua curtipendula*	Vaughan	20	1.8
Blue Grama	*Bouteloua gracilis*	Lovington	15	0.5
Needle and Thread	*Stipa comata*		15	2.3
Green Needlegrass	*Stipa viridula*		10	1.0
Buffalo Grass	*Buchloe dactyloides*	Native	5	0.8
Indian Ricegrass	*Oryzopsis hymenoides*	Paloma	5	0.6
Total			100	10.2

• **Erosion Control**: The sandier soils of this habitat type are susceptible to wind and water erosion. Plant cover should be established quickly to prevent soil loss.

• **Irrigation**: Successful establishment of grasses typically requires irrigation during the first year. Irrigation can be used to help weed control — in early spring, areas with weeds such as cheatgrass can be tilled under; in late spring the desired grass species can be planted and irrigated. Otherwise the grasses would need to be seeded early in the spring when adequate moisture is present. However, at this time cheatgrass is vigorously growing and taking moisture and nutrients from native plants.

• **Fertilization**: Fertilizers are not recommended as they are not needed to support native vegetation.

Plant Encyclopedia

Box Elder -
Acer negundo (Negundo aceroides ssp. interius)

Plant Characteristics
The three-parted leaves are light yellow-green on top and pale green below. They turn a soft brownish yellow in the fall. Yellow flowers bloom in early spring before the foliage appears. Winged, maple-like fruit appears in fall.

Mature Height
60' to 70'

Mature Spread
25'

Flowering Period
Spring

Growth Rate
Rapid

Available Plant Forms
Containers

Exposure
Sun

Water Needs
Moist to seasonally saturated.

Wetland Indicator
FAC

Soils
Occurs in poor soils where other plants do not grow well.

Habitat Characteristics
Forms clumps of trees along stream banks and in flood plains.

Landscape Use
Use as one of the dominant tree species along streams in more naturalized settings. Useful in poor soils.

Management Concerns
Box elder is not a desirable street tree; it is relatively short-lived and can become infested with box elder beetles.

Zone
Foothills, plains

Wildlife Value
Seeds eaten by squirrels, mice, and small birds.

Cottonwood, Lanceleaf -
Populus x acuminata

Plant Characteristics
The densely branched limbs form a rounded crown. Egg-shaped leaves have an abruptly narrow tip and turn from shiny light green in the summer to yellow in the fall.

Mature Height
40' to 60'

Mature Spread
30' to 40'

Flowering Period
Spring

Growth Rate
Fast

Available Plant Forms
Containers

Exposure
Sun

Water Needs
Requires seasonal flooding, until the roots reach the water table. After establishment, adaptable provided the roots remain in contact with the water table.

Wetland Indicator
FAC

Soils
Adaptable

Habitat Characteristics
This is a natural, sterile hybrid between plains and narrowleaf cottonwoods. Reproduces by suckering and branch rooting. Grows in the lower canyons of the foothills and the edge of the plains.

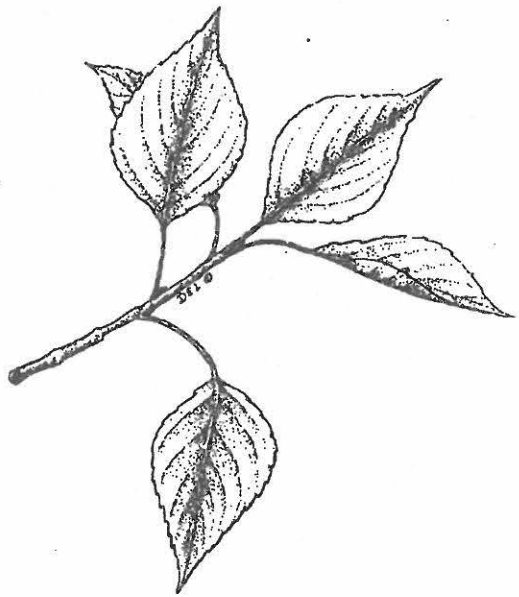
Landscape Use
Use in natural settings of drainages.

Management Concerns
Will sucker in most situations, which may not be desired in more formal settings.

Zone
Foothills, plains

Wildlife Value
Provides cover for birds and large mammals.

Habitat Types
Wetland: Riparian,
Buffer Zone: Woody Riparian



WR BWR

Hackberry, Netleaf -
Celtis reticulata

Plant Characteristics
These trees form a scraggly crown. The thick leaves have a prominent web of veins. Orange-red, spherical-shaped fruit.

Mature Height
25'

Mature Spread
N/A

Flowering Period
Early Spring

Growth Rate
NA

Available Plant Forms
Not available commercially

Exposure
NA

Water Needs
Dry to moist

Wetland Indicator
FAC

Soils
Rocky banks, occasionally sandy soils

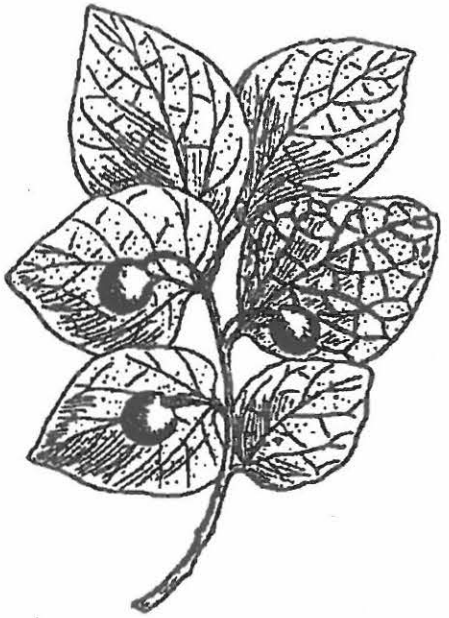
Habitat Characteristics
Grows in drier areas along intermittent streams at the base of the foothills.

Landscape Use
Along the upper banks of the woody riparian area as an understory tree or in more open areas.

Management Concerns
NA

Zone
Foothills

Wildlife Value
Cover



Hazelnut, Beaked -
Corylus cornuta

Plant Characteristics
The hairy, round leaves have irregularly toothed edges. The edible nuts are enclosed in a green or papery husk.

Mature Height
10'

Mature Spread
NA

Flowering Period
NA

Growth Rate
NA

Available Plant Forms
Not currently available commercially

Exposure
Sun to partial shade

Water Needs
Moist to adaptable

Wetland Indicator
FACU

Soils
NA

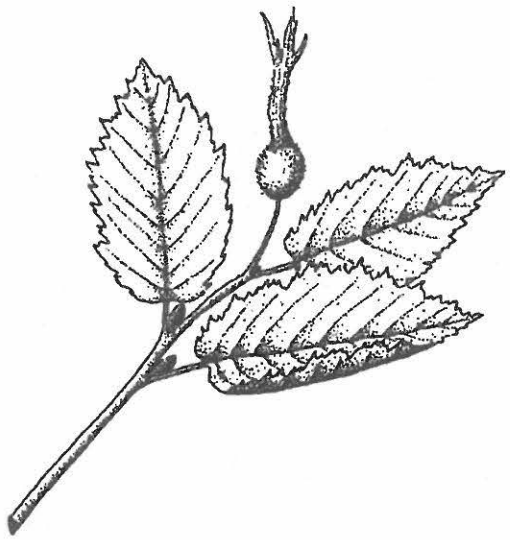
Habitat Characteristics
Occurs in the moist soils of cool ravines and hillsides of the outer foothills.

Landscape Use
As a small understory tree in wooded drainages.

Management Concerns
NA

Zone
Foothills

Wildlife Value
Good wildlife value



Willow, Peachleaf -
Salix amygdaloides

Plant Characteristics
The form of this tree varies from upright from a main trunk to spreading from one or more main trunks. The lance-like leaves are yellowish-green above and a soft pale green below and change to a soft yellow in the fall.

Mature Height
30' to 40'

Mature Spread
25' to 30'

Flowering Period
Mid to late spring

Growth Rate
Rapid growth

Available Plant Forms
Containers

Exposure
Sun

Water Needs
Wet to adaptable; requires seasonal flooding for establishment

Wetland Indicator
FACW

Soils
Alluvial

Habitat Characteristics
Usually occurs in slightly wetter locations than cottonwoods. Very commonly found along streambanks and lake margins. In order to germinate, it requires flooding that creates bare sandbars for the seeds to grow.

Landscape Use
Good as one of the dominant trees in wetter areas along streambanks and lake margins.

Management Concerns
This short-lived, fast-growing tree may not be suitable to urban areas, especially near sidewalks and streets.

Zone
Plains, foothills

Wildlife Value
Cover and nesting sites for songbirds.

Alder, Thinleaf -
Alnus tenuifolia (incana ssp. tenuifolia)

Plant Characteristics
Thinleaf alder forms large shrubs or small trees with many stems, oval to rounded in shape. The main stems are gray with slender, red upper branches. Bright-green, oval-shaped leaves with toothed margins turn yellow in the fall Throughout the winter, the small, reddish-brown, cone-like fruits adhere to the upper branches.

Mature Height
30'

Mature Spread
20'

Flowering Period
Early spring

Growth Rate
Fast

Available Plant Forms
Containers, seed

Exposure
Adaptablé

Water Needs
Seasonally flooded

Wetland Indicator
FACW

Soils
Adaptable including sandy soils

Habitat Characteristics
Forms spreading clumps of multi-branched stems. Provides shade over mountain streams. Often occurs with river birch.

Landscape Use
Plant in moister shadier areas of the buffer zone. In wetland areas it can be planted along the streams.

Management Concerns
None

Zone
Foothills

Wildlife Value
Provides cover for birds and large mammals. Birds feed on the seeds.

WR BWR

Chokecherry, Western
Prunus (Padus) virginiana ssp. melanocarpa

Plant Characteristics
Erect branches form an oval, rounded crown with dense foliage. Grows from rhizomes. The large, thin leaves are dark green above and lighter below. Leaves turn yellow or red in the fall. In mid-spring, drooping clusters of small, fragrant white flowers bloom. The black, slightly sour berries are used by wildlife and make excellent jellies, syrups, or wines.

Mature Height
15' to 30'

Mature Spread
20'

Flowering Period
Mid-spring

Growth Rate
Fast

Available Plant Forms
Containers

Exposure
Sun to partial shade to shade

Water Needs
Dry to moderate

Wetland Indicator
FACU

Soils
Adaptable; prefers seasonally moist

Habitat Characteristics
Common on the upper banks of streams and gullies of the foothills and plains. Forms loose thickets.

Landscape Use
This large bushy shrub is an excellent understory plant for screening riparian areas and providing wildlife habitat.

Management Concerns
May not be desirable in a formal setting next to buildings as it tends to sucker and is very palatable to deer. May need to be fenced during establishment to protect from deer. This shrub is also susceptible to insects and diseases.

Zone
Foothills, plains

Wildlife Value
The fruit is a favorite of birds and a wide variety of other animals.

Currant, Golden -
Ribes aureum

Plant Characteristics
This multi-stemmed shrub forms an erect somewhat irregular-shaped clump. Bright green leaves turn shades of red, yellow, and orange in the fall. The cinnamon-scented, golden, tube-shaped flowers are scattered among the leaves. In the summer small, dark red currants mature and dry on the shrub to form appetizing, raisin-like fruit.

Mature Height
4' to 6'

Mature Spread
5'

Flowering Period
Late spring

Growth Rate
Moderate to fast

Available Plant Forms
Containers

Exposure
Partial shade to sun

Water Needs
Moist to dry

Wetland Indicator
FACW

Soils
Adaptable, prefers well-drained, sandy loams. Tolerates alkaline soils without turning yellow.

Habitat Characteristics
Commonly found along streams in the lower foothills and plains. Associated with rabbitbrush, Rocky Mountain maple, Saskatoon serviceberry and chokecherry.

Landscape Use
Use as an understory species along streambanks. This beautiful, fragrant shrub would be excellent in moister areas next to public pathways and other highly visual sites.

Management Concerns
None known

Zone
Foothills, plains

Wildlife Value
Provides food and shelter for a variety of animals

WR

Dogwood, Redosier -
Cornus stolonifera (Swida sericea)

Plant Characteristics
Broad, round shrub with dark red branches that are especially visible during the winter. White flowers form flat-topped clusters that become white berry-like fruit.

Mature Height
6' to 8'

Mature Spread
8' to 12'

Flowering Period
Late spring to early summer

Growth Rate
Fast

Available Plant Forms
Containers

Exposure
Adaptable

Water Needs
Wet to adaptable

Wetland Indicator
FACW

Soils
Sand to loam

Habitat Characteristics
Commonly found in shaded canyons of the foothills.

Landscape Use
Use as an understory species for cottonwoods and alders along streams or in the moister portions of the Buffer Zone.

Management Concerns
NA

Zone
Foothills

Wildlife Value
Food for mammals and birds

Maple, Rocky Mountain - *Acer glabrum*

Plant Characteristics
This small tree or large shrub has smooth, gray trunks with many fine branches that form an irregular oval crown. Clusters of small, yellowish flowers bloom in early spring at the same time when leaves appear. The 3 to 5 lobed, dark green leaves turn a vivid yellow with bright red highlights in the fall. The 2-winged seeds turn green or light red in late summer.

Mature Height
10' to 20'

Mature Spread
10' to 15'

Flowering Period
Early spring

Growth Rate
NA

Available Plant Forms
Containers

Exposure
Sun, partial shade

Water Needs
Adaptable

Wetland Indicator
FAC

Soils
Loam to clay

Habitat Characteristics
Prefers cooler north-facing slopes and streambanks.

Landscape Use
Can be planted under large trees to provide vertical complexity.

Management Concerns
None

Zone
Foothills

Wildlife Value
Provides shelter for a variety of animals.

WR BWR

Rabbitbrush, Rubber -
Chrysothamnus nauseosus

Plant Characteristics
An irregularly rounded shrub with silvery, herbaceous stems and green, leaves. Deeply branched taproots vigorously sucker. Feathery clusters of small, golden flowers form at the end of twigs. The strongly-scented flowers turn into fluffy seed clusters that remain attached through winter into early spring. There are several native subspecies; the two most appropriate and commercially available for this region are: *C.n. nauseosus and C.n. graveolens.*

Mature Height
1' to 6', varies per subspecies

Mature Spread
Variable

Flowering Period
Late summer, fall.

Growth Rate
Establishes easily, spreads rapidly.

Available Plant Forms
Containers, seed

Exposure
Sun

Water Needs
Dry. Drought tolerant, especially after establishment. Tolerates poorly drained soil, but does not grow well in areas of permanent high water tables.

Wetland Indicator
Upland

Soils
Clayey to sandy soils. Occurs on alkaline and salty soils.

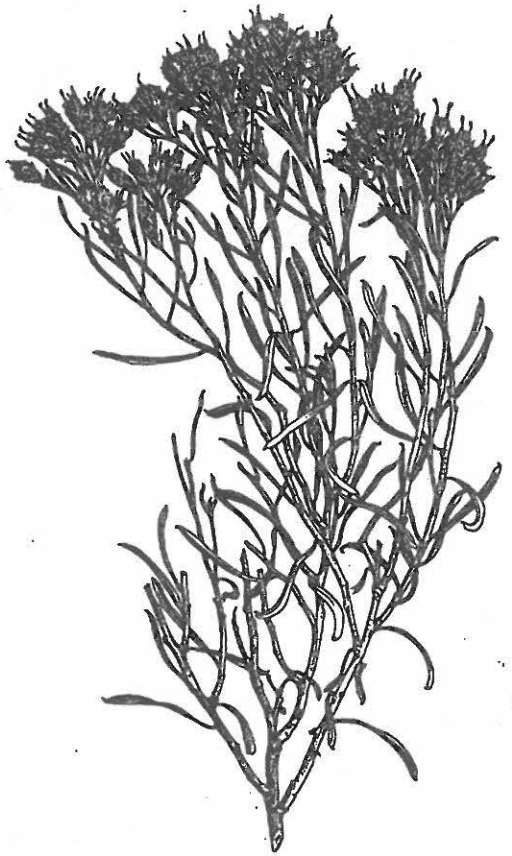
Habitat Characteristics
Scattered clumps occur on the dry, grasslands of the plains and foothills. Grows with sagebrush and a wide variety of short to midgrass species. The subspecies *C.n. nauseosus* is common on the eastern plains and foothills. *C.n. graveolens* grows in deep soils and intermittent drainages of the plains.

Landscape Use
Use in dry areas and on south facing slopes, especially in areas with alkaline soils; also can be planted on more moist sites on upper banks. Useful for soil stabilization. The attractive winter form and the late blooming flowers make this an attractive plant in highly visible areas.

Management Concerns
May attract deer. Can reseed readily. In open space areas, plant only the appropriate subspecies.

Zone
Plains, foothills

Wildlife Value
Good cover for birds and small mammals. Browsed by deer and rabbits. Attracts bees and butterflies



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Sage, Fringed -
Artemisia frigida

Plant Characteristics
Half shrub with annual stems that grow from a woody base. Moderately deep, branched taproots. The stems form a low, spreading shrub. Silvery green, finely dissected leaves form a delicate, feathery shape. Aromatic. Small, indistinct, yellow flowers form a long narrow spike.

Mature Height
6" to 18"

Mature Spread
NA

Flowering Period
Late summer

Growth Rate
Can germinate quickly.

Available Plant Forms
Seeds

Exposure
Sun to partial shade

Water Needs
Adaptable. Good drought tolerance for both seedlings and mature plants

Wetland Indicator
Upland

Soils
Wide range from loams to thin, rocky, and gravely soils.

Habitat Characteristics
Common on open exposed sites and under larger shrubs in the dry plains and foothills. Occurs with blue grama, needle-and-thread, and mountain muhly.

Landscape Use
Grow on dry, exposed slopes, level plains, and rocky areas. Useful as a pioneer species for quick establishment.

Management Concerns
May attract deer. Plant seeds on the surface because light helps germination. Plant in late fall or early spring when reliable surface moisture is present. This quick-growing species has a tendency to overtake an area.

Zone
Plains, foothills

Wildlife Value
Winter forage for deer.

Sagebrush, Silver -
Artemesia cana (Seriphidium canum)

Plant Characteristics
Small, rounded shrub grows from deep, well branched roots. Stiff, silvery branches contain silvery-gray linear leaves. Small, insignificant, pale yellow flowers grow in a narrow cluster. Very aromatic.

Mature Height
2' to 5'

Mature Spread
2'

Flowering Period
Midsummer

Growth Rate
Germinates rapidly. Fair seedling vigor.

Available Plant Forms
Plants, seeds

Exposure
Sun

Water Needs
Moist. Tolerates periodical flooding. Drought tolerant

Wetland Indicator
FACU

Soils
Loams to sands, not on dense clay

Habitat Characteristics
Occurs on the edge of drainage areas. Occurs with western wheatgrass, sedges, and rushes.

Landscape Use
Use for stabilizing banks of streambeds and in other moist locations. Useful in areas where the moisture content of the soils varies through the seasons.

Management Concerns
Best to use local sources for seeds.

Zone
Foothills, plains

Wildlife Value
Winter forage for wildlife such as deer.

Snowberry, Western or Wolfberry - *Symphoricarpos occidentalis*

Plant Characteristics
Pairs of thick, oblong leaves grow on the stems. Small, pink, tubular flowers form rather dense clusters in the axis of the stem. Later, they form round, greenish-white fruit.

Mature Height
1' to 3'

Mature Spread
5'

Flowering Period
Summer

Growth Rate
NA

Available Plant Forms
Containers

Exposure
Sun to shade

Water Needs
Dry to moist. Occurs in areas of intermittent drainages.

Wetland Indicator
Not rated

Soils
NA

Habitat Characteristics
Forms dense colonies in grassy swales of the mountains and plains. It also occurs on upper banks of stream channels.

Landscape Use
Snowberry is a good shrub to plant in masses across the bottom of occasionally wet drainages and as a low understory in riparian areas.

Management Concerns
NA

Zone
Plains, foothills

Wildlife Value
Shelter for birds and small mammals

Sumac, Skunkbush -
Rhus trilobata (aromatica ssp. trilobata)

Plant Characteristics
Loosely spreading branches forms a wide rounded shape. Deep, many branched roots with spreading rhizomes. Glossy dark green leaves with three lobes turn various shades of yellows and reds. The stems and leaves have a slight skunk-like odor. The cluster of small yellow flowers bloom before the leaves appear in the spring. Orangish red fruit matures in late summer to fall. The edible fruit is used to make a lemonade-like drink, and Native Americans use it to flavor pemmican.

Mature Height
2' to 6'

Mature Spread
NA

Flowering Period
Spring

Growth Rate
Slow stand development. Develops faster from transplants.

Available Plant Forms
Plants, seeds.

Exposure
Full sunlight to some tolerance of partial shade.

Water Needs
Well-drained soils. Does not tolerate saturated soils. Moderate drought tolerance.

Wetland Indicator
NI

Soils
Adaptable, thin rocky soils to sandy areas.

Habitat Characteristics
Forms thickets on dry, rocky, south-facing slopes in the foothills to sandhills on the plains. Associated with mountain mahoganies, juniper, and rabbitbrush.

Landscape Use
Plant on upper banks in open areas especially where susceptible to erosion. Use as a sand trap barrier in extremely sandy soils. Can be used for barrier plantings.

Management Concerns
Best to transplant small plants or stem and root cuttings. Rodents may girdle young plants. This species may not be appropriate next to highly trafficked areas because of the slight malodorous smell of the leaves.

Zone
Plains, foothills.

Wildlife Value
Cover for birds and mammals. Low to fair palatability to deer.

Willow, Sandbar or Coyote - *Salix exigua*

Plant Characteristics

Long slender branches form an upright, irregularly shaped shrub. New branches are golden yellow changing to light gray as they mature. Fuzzy yellow-green catkins form in early spring before the linear grayish-green leaves appear.

Mature Height

6' to 12'

Mature Spread

4' to 8'

Flowering Period

Early spring

Growth Rate

Rapid

Available Plant Forms

Cuttings (see BMPs), containers

Exposure

Sun

Water Needs

Wet. Requires seasonal flooding. After establishment, can tolerate seasonal drying as long as roots have had a chance to grow to the water table. May need supplemental watering during establishment.

Wetland Indicator

OBL

Soils

Rocky to sandy soils

Habitat Characteristics

This readily suckering shrub forms large colonies on low-lying sandbars, riverbanks, and along lake margins. It is extremely common in the valleys of the outer foothills and plains.

Landscape Use

This species is very tolerant of occasional flooding and is excellent for bank stabilization in drainages.

Management Concerns

Plant cutting in early spring before the buds open. For both cuttings and containers, plant before spring runoff to meet the species' water requirements. However, this timing may not work in areas of high volume runoff (such as Boulder Creek) where newly planted shrubs may wash away. In these areas, cuttings may be stored in water in a cool location until high water subsides. If runoff is inadequate or later than anticipated, supplemental watering will be needed until the roots get established.

Zone

Foothills, plains

Wildlife Value

Shelter for a variety of animals and food for deer.

WR WHW

Vines

Grape, River -
Vitis riparia

Plant Characteristics
Woody climbing vine with coiling tendrils. Large maple-like leaves. The inconspicuous flowers mature into sweet white grapes.

Mature Length
Various

Flowering Period
NA

Exposure
Sun to partial shade

Water Needs
Adaptable to moist

Soils
NA

Wetland Indicator
FACW

Available Plant Forms
Container

Growth Rate
NA

Habitat
Grows in wooded canyons of the outer foothills.

Landscape Use
Use as a ground cover or as a climbing vine in moist woody drainages.

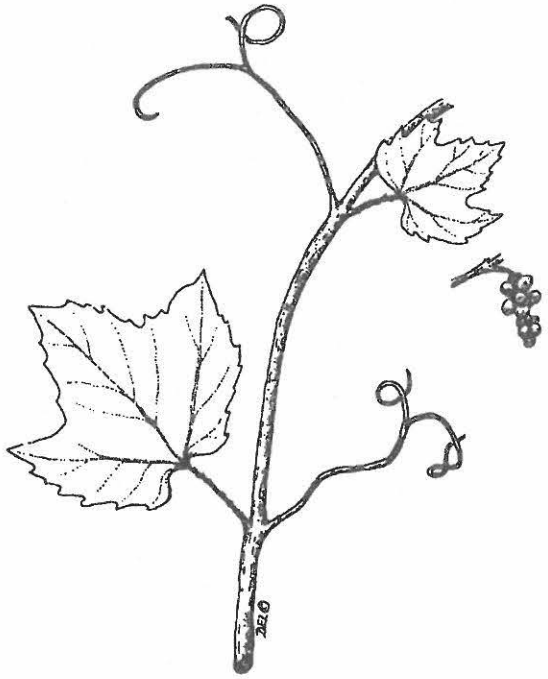
Zone
Foothills

Wildlife Value
Food for a variety of animals.

Management Concerns
NA

Available Plant Forms
Container

Growth Rate
NA



Alkali Grass -
Puccinellia nuttalliana (airoides)

Plant Characteristics
Tufted grass with erect stems. The spikelets form an open pyramidal-shaped panicle.

Mature Height
6" to 12"

Flowering Period
Warm, cool

Growth Rate
Medium

Available Plant Forms
Containers, seeds

Exposure
Sun

Water Needs
Temporary flooding

Wetland Indicator
OBL

Soils
Highly tolerant of alkaline soils

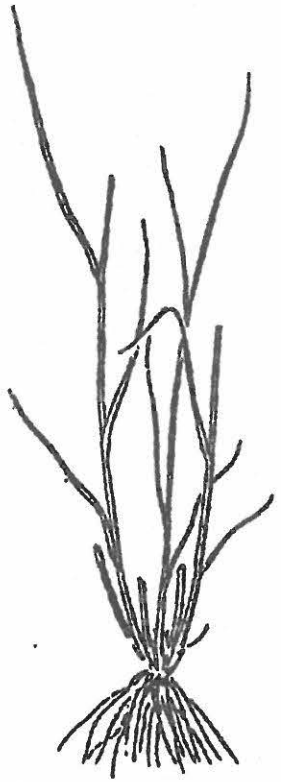
Habitat Characteristics
Occurs on saline and alkaline flats at the edge of reservoirs from moist soils to sometimes within standing water.

Landscape Use
Useful in stabilizing shorelines and marshes. Provides cover in alkaline flats.

Management Concerns
NA

Zone
Plains

Wildlife Value
Waterfowl cover



Arrowweed - *Triglochin maritima*

Plant Characteristics
Rhizomatous. Slender flowering stem rises from a cluster of linear leaves. Small yellow flowers form a narrow spike at the top of the stem.

Mature Height
12" to 8"

Flowering Period
Summer

Growth Rate
Slow

Available Plant Forms
Plants, seeds

Exposure
Sun

Water Needs
Seasonally flooded.

Wetland Indicator
OBL

Soils
Moderately tolerant of alkaline soils

Habitat Characteristics
Occurs on alkaline flats and wet meadows.

Landscape Use
Delicate looking plant can be grown among sedges and grasses on wet sites including alkaline.

Management Concerns
Slow growing

Zone
Plains

Bluestem, Little -
Schizachyrium (Andropogon) scoparium

Plant Characteristics
Perennial bunchgrass, occasionally with short rhizomes. Deep fibrous root system. The light blue-green leaves turn an attractive reddish brown when mature. Small, feathery spikelets are scattered along the upper stem.

Mature Height
Mid grass; 1' to 4' tall

Flowering Period
Warm season, new growth in the spring, flowers in late summer and matures in the fall.

Growth Rate
Low germination rate but also spread by tillers

Available Plant Forms
Seeds, containers

Exposure
Sun to partial shade.

Water Needs
More drought tolerant than big bluestem. Not very tolerant of flooding and high water.

Wetland Indicator
FACU

Soils
Adaptable. Sand to clay. Usually found on coarse textured well-drained soils. Not salt tolerant.

Habitat Characteristics
Widespread species of the plains. Occurs with big bluestem, sideoats grama, and prairie dropseed on clayey, mesic sites. On sandier mesic sites, grows with prairie sandreed and sand bluestem. Semi-sod former.

Landscape Use
Useful for erosion control on a variety of soils including sand. Use on the upper banks of drainages and swales that receive more moisture than the surrounding area but are not saturated for any period of time. Also can be planted in gravely outwashes. Attractive reddish color in the late summer and fall makes it a good accent plant.

Management Concerns
Need to mulch on disturbed sites. Weeds need to be controlled in new seedlings. Seed in spring.

Zone
Plains

Wildlife Value
Fairly palatable to deer.

Bulrush, Alkali -
Scirpus maritimus (Bolboschoenus maritimus ssp. paludosus)

Plant Characteristics
Rhizomatous, sod forming. Stout, triangular stems. Three long, leafy bracts cluster under the large, football shaped spikelets.

Mature Height
2' to 3'

Flowering Period
NA

Growth Rate
Medium

Available Plant Forms
Bare root, containers, seeds

Exposure
Sun

Water Needs
Muddy to 6" standing water

Wetland Indicator
OBL

Soils
Highly tolerant of saline and alkaline soils.

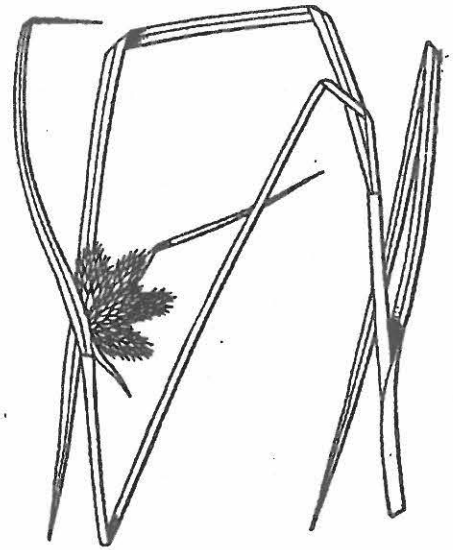
Habitat Characteristics
Occurs near ponds, lakes or in marshes with alkaline soils.

Landscape Use
Plant in open areas at the edge of standing water. These areas would range from muddy to shallowly inundated. Especially useful in alkaline and salty areas. Useful for wildlife habitat.

Management Concerns
May be difficult to grow from seeds.

Zone
Plains, foothills

Wildlife Value
Provides food and cover for waterfowl and shorebirds.



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Bulrush, Small fruit -
Scirpus microcarpus

Plant Characteristics
Rhizomatous. Medium tall stems with broad leaves. Spikelets can occur at the end of the stem in a cluster of leaf-like bracts.

Mature Height
3'

Flowering Period
NA

Growth Rate
Medium

Available Plant Forms
Bare root, containers

Exposure
Sun

Water Needs
Muddy to 6" standing water

Wetland Indicator
OBL

Soils:

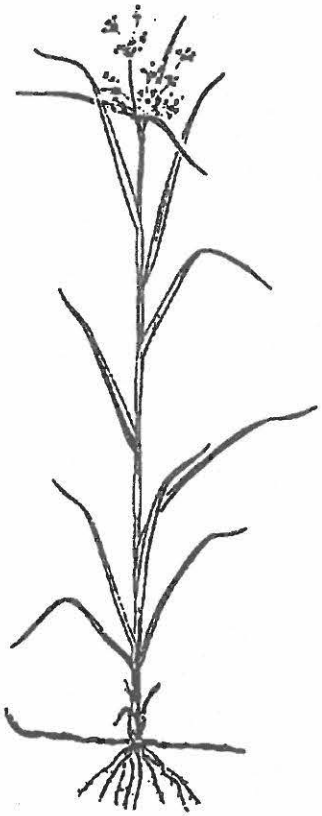
Habitat Characteristics
Grows along the wet shoreline of ponds and ditches, and in marshes from the plains to the mountains.

Landscape Use
Use in open areas at the very edge of the shoreline where there is less than 6" of standing water.

Management Concerns
NA

Zone
Plains, foothills.

Wildlife Value
Cover for waterfowl.



WHW WSW

Bur-reed -
Sparganium eurycarpum

Plant Characteristics
Balls of flowers attached to the zig-zagging stem with narrow leaves.

Mature Height
2' to 4'

Flowering Period
NA

Growth Rate
Rapid

Available Plant Forms
Bare root, containers

Exposure
Sun

Water Needs
Standing water 6" to 12"

Wetland Indicator
OBL

Soils
Medium salt tolerant

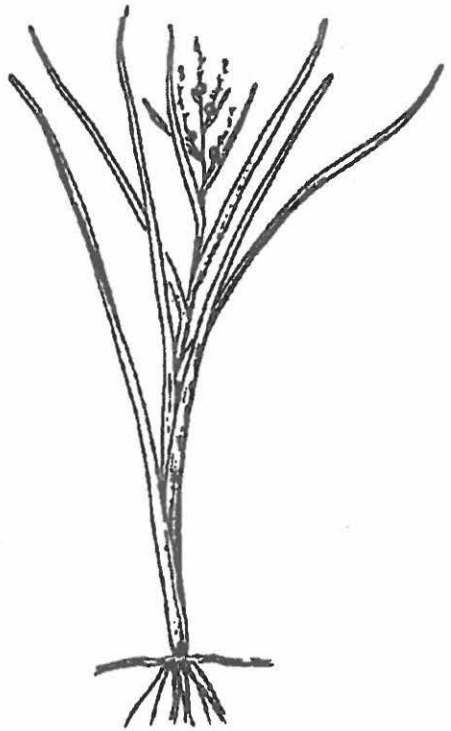
Habitat Characteristics
Margins of ponds. Usually grows with bulrushes. In deeper waters, the leaves get very long and the plants do not flower.

Landscape Use
Plant in open areas at the shallow end of the ponds. Useful for filtering moderate amounts of pollutants. Clumps of bur-reed and bulrushes can be intermixed with clumps of shorter species such as arrowhead for an attractive effect.

Management Concerns
NA

Zone
Plains, foothills

Wildlife Value
Food and cover for waterfowl



Cordgrass, Prairie -
Spartina pectinata

Plant Characteristics
Large rhizomatous grasses forms a dense sod. The long arching leaves have sharp edges. A series of brush-like spikelets are clustered at the end of the stem.

Mature Height
3' to 5'

Flowering Period
Warm season.

Growth Rate
Rapid

Available Plant Forms
Container, seed

Exposure
Full sun

Water Needs
Seasonally flooded

Wetland Indicator
FACW/OBL

Soils
Moderately alkaline tolerant

Habitat Characteristics
Moist to wet meadows, marshes, streambanks and pond shores. This sod-forming grass grows in dense patches to the exclusion of other grasses.

Landscape Use
Plant in large patches in wet meadows and in unshaded areas around the shores of ponds and streams to help stabilize the soil. Useful in alkaline soils.

Management Concerns
Invasive, tends to dominate the sites. May be difficult to establish from seed. Plant seed in spring.

Zone
Foothills, plains

Wildlife Value
Cover for birds and small mammals

WR WHW

Grama, Sideoats - *Bouteluoa curtependula*

Plant Characteristics
This bunchgrass is semi sod-forming with short rhizomes. Medium-wide, bluish green leaves turn brown in the fall. Purplish, one-sided spikelets grow on a long stem. Later in the summer small bright orange anthers appear amidst the spikelets.

Mature Height
Midgrass, 1' to 2'

Flowering Period
Warm season.

Growth Rate
Easy to grow from seed if planted in late summer, 2 months before the first frost.

Available Plant Forms
Seeds

Exposure
Sun

Water Needs
Moderately drought resistant; although not as much as blue grama.

Wetland Indicator
Upland

Soils
Wide range from sandy to clayey soils. Does not tolerate loose sands and dense clays well.

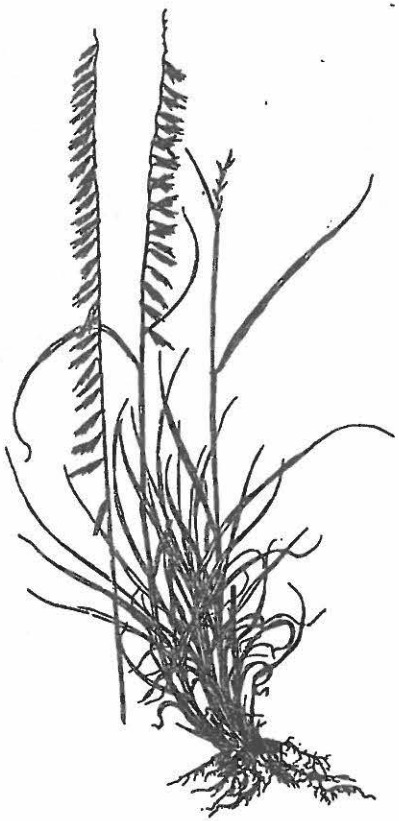
Plant Characteristics
Occurs in the short to mixed grass prairies of Colorado. Associated with blue grama and little bluestem.

Landscape Use
Very hardy. Useful for erosion control in moderately dry soils, especially with other grasses. Can be used as an accent plant either alone or with other species. Provides a tall ground cover.

Management Concerns
Slower growing. Needs mowing and other weed control. Plant seeds in spring.

Zone
Plains, foothills

Wildlife Value
Highly palatable in spring and summer



BWR BMG BDG

Mannagrass - *Glyceria striata*

Plant Characteristics
Narrow leaf blades with spikelets of open panicles.

Mature Height
2' to 3'

Flowering Period
NA

Growth Rate
Rapid

Available Plant Forms
Bare root, containers.

Exposure
Sun to partial shade

Water Needs
Seasonally flooded to areas with shallow standing water.

Wetland Indicator
OBL

Soils
Mildly tolerant of saline soils.

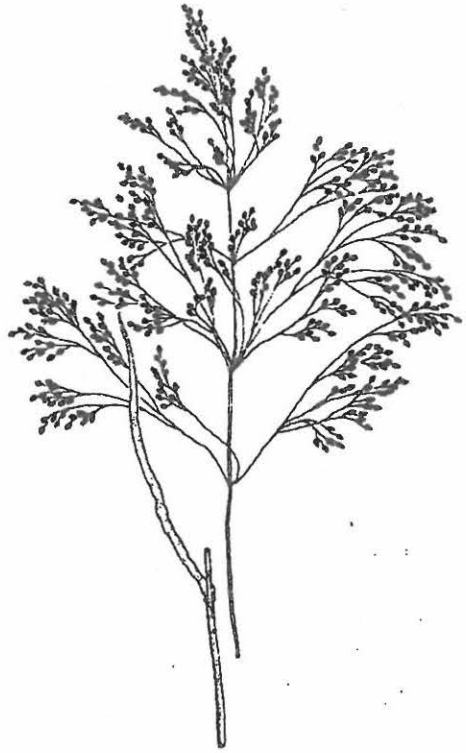
Habitat Characteristics
Shallow standing water or along slow moving streams.

Landscape Use
Rapid growth makes it useful for bank stabilization along streams and the edge of ponds. Use for wildlife habitat.

Management Concerns
N/A

Zone
Plains, foothills

Wildlife Value
Food for deer and waterfowl.



WR WHW WSW

Needlegrass, green -
Stipa (Nassella) viridula

Plant Characteristics
This tall, bunchgrass has a deep, extended, fibrous root systems. Many, glossy, bright green leaves grow in a dense basal tuft. The long, narrow spike has many one-seeded spikelets with long, bent awns.

Mature Height
Mid to tall grass. 1.5' to 3.5'

Flowering Period
Cool season.

Growth Rate
Good growth rate with excellent seedling vigor. Average rate of establishment. Long-lived.

Available Plant Forms
Seeds

Exposure
Sun to tolerant of partial shade.

Water Needs
Adaptable. Tolerates occasional flooding. Good drought tolerance Prefers water table a few feet below the surface.

Wetland Indicator
Upland

Soils
Adaptable, thrives on clayey soils. Good in soils with poor fertility. Thrives on moderately alkaline soils. Fairly salt tolerant.

Habitat Characteristics
Occurs in moist intermittent drainages and in shallow depressions along the plains and foothills. Green needlegrass grows with western wheatgrass in the slightly moister areas of the plains. It is less commonly associated with silver sagebrush, blue, grama, and needle-and-thread.

Landscape Use
Use in seed mixtures for erosion control in grassy drainages and stream banks.

Management Concerns
Should not be planted as pure stands as it tends to thin out over time. Weeds need to be controlled, especially in the first month or two after germination. Seed in fall or spring.

Zone
Plains, foothills

Wildlife Value
Valuable to songbirds and small rodents.

BWR BMG BDG

Rush, Baltic or Arctic -
Juncus balticus (arcticus)

Plant Characteristics
Sod-forming, wiry round stems grow from rhizomes. The flowers form loose to spreading clusters that appear to emerge from the side of the stem.

Mature Height
6" 30"

Flowering Period
Early summer

Growth Rate
Medium

Available Plant Forms
Containers, seeds

Exposure
Sun

Water Needs
Moist to saturated

Wetland Indicator
OBL

Soils
Moderately tolerant of alkaline and acidic conditions

Habitat Characteristics
Occurs in a wide range of areas from alkaline wet meadows and marshes to drier intermittent swales and moist edges of ponds. Forms a dark band around the edge of streams and ponds. Similar to the conditions for threesquare but usually occurs in drier areas.

Landscape Use
Use in areas of widely fluctuating water tables near the edge of marshes, wet meadows, and ponds.

Management Concerns
May not grow well from seeds.

Zone
Plains, foothills

Wildlife Value
Cover for small mammals

Saltgrass, Inland -
Distichlis spicata (stricta)

Plant Characteristics
Strongly rhizomatous plants with prostrate stems that turn up at the ends. Leaves grow at a sharp angle from the stem. The large spikelets occur in a loose cluster at the end of the stem. Male and female flowers grow on separate plants.

Mature Height
4" to 18"

Flowering Period
Warm season

Growth Rate
NA

Available Plant Forms
Seeds

Exposure
Sun

Water Needs
Dry to moist

Wetland Indicator
NI

Soils
Highly tolerant of saline and alkaline sites.

Habitat Characteristics
Grows on moist alkaline flats and along ditches.

Landscape Use
Plant on moist medium to very salty or alkaline sites. Useful in areas that are too salty or saline for other species.

Management Concerns
Seed in spring.

Zone
Plains

Wildlife Value
NA

Sedge, Woolly -
Carex lanuginosa

Plant Characteristics
Rhizomatous plants with sharply triangular stems. Dark green, flat leaf blades. Woolly flowering spikes.

Mature Height
1' to 3'

Flowering Period
NA

Growth Rate
Medium

Available Plant Forms
Bare root, containers, seeds

Exposure
Sun

Water Needs
Seasonally flooded to shallow standing water. Tolerates dry periods.

Wetland Indicator
OBL

Soils
Only mildly tolerant of saline or acidic soils.

Habitat Characteristics
Occurs in wet meadows and along ponds and streams from the plains to the subalpine.

Landscape Use
Use along the edge of streams and ponds especially in areas where fluctuating water levels are expected. Useful as a bank stabilizer. Also plant in wet meadows.

Management Concerns
May be difficult to grow from seeds.

Zone
Plains, foothills

Wildlife Value
Cover for waterfowl

WHW WSW

Spikerush, Needle -
Eleocharis acicularis

Plant Characteristics
Rhizomatous with slender, dark green stems forming dense clumps. On the top of the stems grow a tight cluster of flowers that give the appearance of a spear tip.

Mature Height
6" to 18"

Flowering Period
Summer

Growth Rate
Rapid

Available Plant Forms
Plants

Exposure
Sun

Water Needs
Saturated to up to 3" of inundation.

Wetland Indicator
OBL

Soils
Slight tolerance of alkaline soils

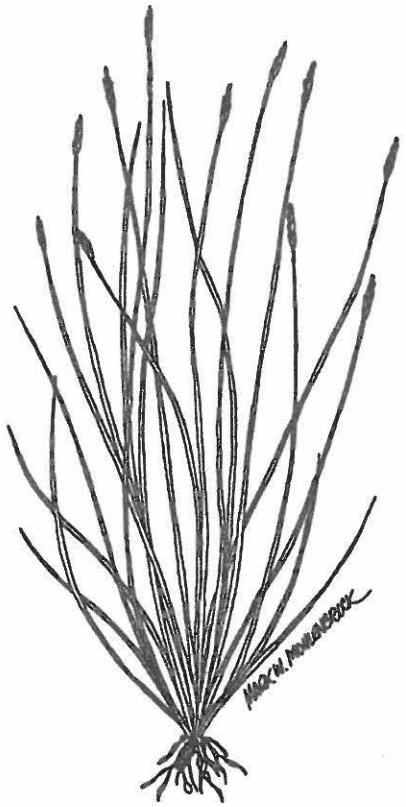
Habitat Characteristics
Occurs on marshy shores, margins of ponds, and other places with saturated soils.

Landscape Use
Use for bank and pond margin stabilization.

Management Concerns
May be difficult to grow from seeds.

Zone
Foothills, plains

Wildlife Value
Food for waterfowl



WHW WSW

Wheatgrass, Slender -
Agropyron trachycaulum (Elymus trachycaulus)

Plant Characteristics
This short-lived, perennial grass usually grows in bunches with very short rhizomes. The spikelets alternative on either side of the flowering stem.

Mature Height
Mid grass

Flowering Period
Cool

Growth Rate
Establishes easily and quickly. Short-lived.

Available Plant Forms
Seeds

Exposure
Sun to partial shade

Water Needs
Moist to adaptable. Does not tolerate flooding well. Drought tolerant.

Wetland Indicator
FACU

Soils
Adaptable, best on loams to clay. Saline tolerant.

Habitat Characteristics
Grows in shallow depressions and other moist areas of the plains.

Landscape Use
Use in the early stage of restoration projects as it establishes easily and quickly. Can be planted in intermittent drainages as long as the soils aren't saturated for long periods.

Management Concerns
Short-lived; may disappear from a site. Plant in fall or spring.

Zone
Plains

Wildlife Value
Palatable to livestock

WR BWR BMG

Wildrye, Canada or Nodding -
Elymus canadensis

Plant Characteristics
Coarse bunchgrass with fibrous roots. Can spread by tillers. Long, flat leaf blades. The large, nodding spikelets have long distinctive awns.

Mature Height
2' to 4'

Flowering Period
Cool season.

Growth Rate
Fairly easy establishment with vigorous seedlings. Rapidly spreads; short-lived.

Available Plant Forms
Seeds

Exposure
Shade to sun

Water Needs
Moist to wet. Tolerates short term flooding and saturation. Relatively tolerant of summer drought.

Wetland Indicator
FACU

Soils
Adaptable. Salt tolerant.

Habitat Characteristics
This grass occurs in shady riparian areas and lake shores. Also is commonly found along fence rows.

Landscape Use
Use in shady areas under trees and shrubs in drainages. Useful for bank stabilization. Can be used as a rapid developer and site stabilizer in seeding mixes.

Management Concerns
Not very competitive in mixtures over long periods of time. Plant in fall or spring.

Zone
Foothills, plains

Wildlife Value
Good palatability

WR BWR BMG

Arrowhead -
Sagittaria latifolia

Plant Characteristics
Tuberous root eaten by Native Americans and wildlife. The flowering stalk with a cluster of showy white flowers rising from the loose tuft of arrow shaped leaves.

Mature Height
6" to 18"

Flowering Period
July-August

Growth Rate
Rapid

Available Plant Forms
Containers

Exposure
Sun

Water Needs
6" to 12" of standing water.

Wetland Indicator
OBL

Soils
Moderately salt tolerant and mildly acid tolerant

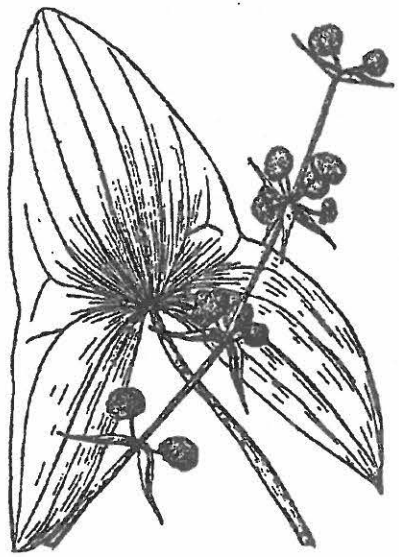
Habitat Characteristics
Found in muddy ditches and along pond shores on the plains and lower foothills.

Landscape Use
Plant clumps in shallow water intermixed with taller clumps of bur-reed and bulrushes. Makes a very attractive addition to the edge of ponds.

Management Concerns
Need to protect establishing plants from waterfowl.

Zone
Plains, foothills

Wildlife Value
The tuberous roots make this a desirable plant for waterfowl. Also, food for small mammals.



Coneflower, Prairie or Mexican Hat - *Ratibida columnifera*

Plant Characteristics

Upright stems grow from relatively shallow taproots forming an airy clump. Bright green, finely divided leaves grow from the middle of the stem up. Showy flowers with droopy, yellow to purple outer rays growing around the brown column.

Mature Height

1' to 2'; spreads 1' to 1.5'

Flowering Period

Plant starts turning green in spring and flowers in the summer.

Growth Rate

Germinates in about a month. Fair seedling vigor. Slow growth. Short-lived, 2 to 3 years.

Available Plant Forms

Seeds and plants

Exposure

Sun

Water Needs

Relatively dry, but not in the driest areas. Tolerates moist soils.

Wetland Indicator

Upland

Soils

Clays to rocky, gravely, and sandy soils. Best on well-drained loams. Tolerates poor soil.

Habitat Characteristics

Commonly found on open sites on the outwash mesa and plains. Usually grows with little bluestem, sideoats grama, western wheatgrass, and blue grama, buffalograss, penstemons, and dotted gayflower.

Landscape Use

This easy to establish flower can be used in a seed mixture of short and mid grass prairie species to add scattered color to the restored prairie. Flowers for most of the summer. Also can be planted in clusters as an accent in specific areas.

Management Concerns

Only fair seedling vigor. Short-lived, but reseeds.

Zone

Plains, foothills.

Wildlife Value

Songbirds and small mammals eat the seeds. Butterflies, hummingbirds, bees, and moths use the nectar.

Easter Daisy -
Townsendia exscapa

Plant Characteristics
Large white flowers are nestled in a cluster of linear leaves. Grows close to the ground.

Mature Height
2" to 6"

Flowering Period
Early spring

Growth Rate
NA

Available Plant Forms
Containers

Exposure
Sun

Water Needs
Adaptable to dry

Wetland Indicator
Upland

Soils
Coarse

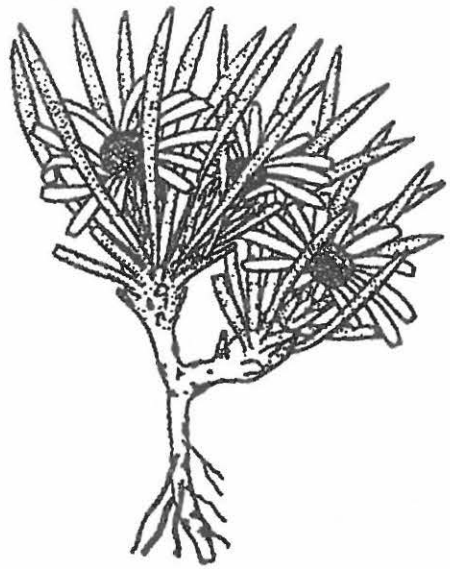
Habitat Characteristics
Grows in open, rocky areas along the outwash mesas and plains of Colorado. One of the first plants to flower in the spring.

Landscape Use
Use for early spring color in a short grass prairie setting with blue grama or buffalograss; also plant in rocky areas.

Management Concerns
Easily shaded out in taller grasslands and shrubby areas.

Zone
Plains

Wildlife Value
NA



Gayfeather, Dotted -
Liatris punctata

Plant Characteristics
Narrow flowering stems rise from a tuft of grass-like leaves. The gray-green, dotted leaves are taller at the bottom and shrink as they extend up the stem. Bright pinkish lavender flowers grow in a narrow spike at the top of the stem. Deep tuberous tap root

Mature Height
2', spreading 12" to 18"

Flowering Period
Mid-summer to frost

Growth Rate
Slow to establish but then moderate growth rate, long-lived.

Available Plant Forms
Seed, plants

Exposure
Full sun

Water Needs
Low

Wetland Indicator
Upland

Soils
prefers gravely, poor, shallow soils. Grows more weedy with richer, moist soils.

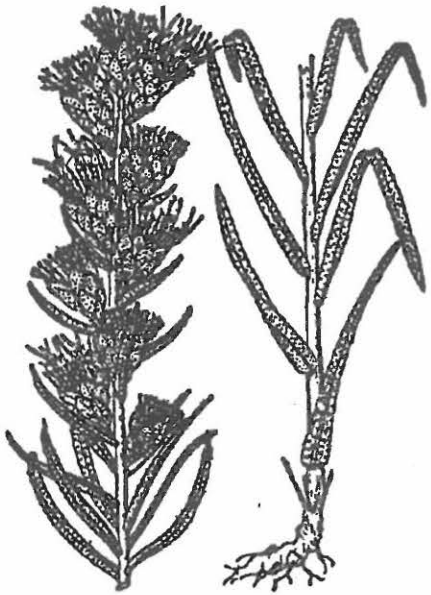
Habitat Characteristics
Found in the grasslands of the foothills, outwash mesas, and plains. Occurs with blue grama, and Indian ricegrass.

Landscape Use
Use with warm season grasses as erosion control on slopes and upper stream banks. Useful as an accent plant for fall color.

Management Concerns
Slow to establish

Zone
Plains, foothills.

Wildlife Value
Nectar source for butterflies and bees. Not usually browsed by deer.



Milkweed, showy -
Asclepias speciosa

Plant Characteristics
Large, spear-shaped leaves occur in pairs on the tall stems with milky sap. Clusters of showy rose pink flowers grow at the end of the stems. In late summer, large pods form that contain numerous silky white seeds.

Mature Height
3'

Flowering Period
Summer

Growth Rate
NA

Available Plant Forms
Seeds

Exposure
Sun

Water Needs
Adaptable to moist

Wetland Indicator
FAC

Soils
NA

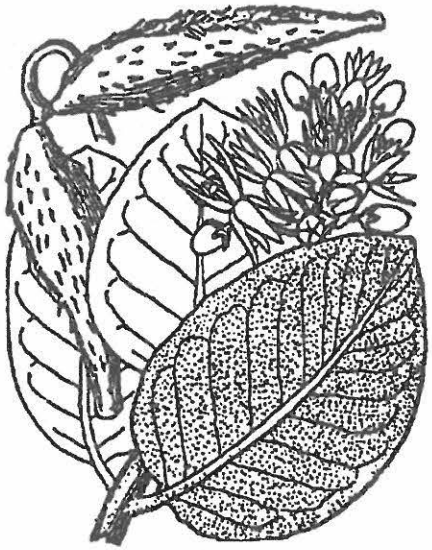
Habitat Characteristics
Occurs in open areas along fences, on the upper banks of streams and lakes, and other open areas of the prairie.

Landscape Use
A beautiful flower to plant in visible areas on banks and along fences.

Management Concerns
NA

Zone
Plains, foothills

Wildlife Value
Attracts butterflies



Onion, Nodding -
Allium cernuum

Plant Characteristics
Flowering stalk grows from a cluster of linear leaves. White flowers form a cluster at the end of the nodding stem.

Mature Height
1'-2.5'

Flowering Period
July-August

Growth Rate
NA

Available Plant Forms
Seed

Exposure
Sun

Water Needs
Dry

Wetland Indicator
Upland

Soils
Variable, rocky.

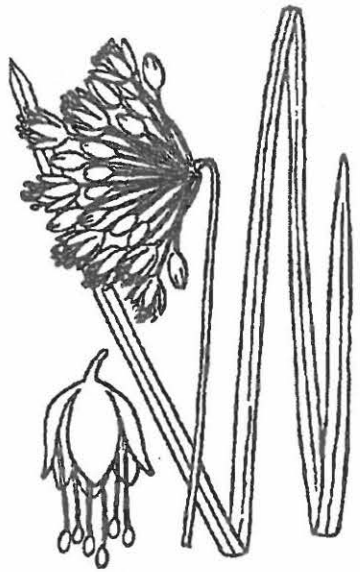
Habitat Characteristics
Usually found on grassy slopes and dry meadows of the foothills and mountains.

Landscape Use
Use in a grass mix on dry grassy slopes.

Management Concerns
NA

Zone
Foothills

Wildlife Value
Nectar source for butterflies and bees. Small mammals dig up and eat the underground onion.



Prairieclover, purple -
Petalostemon purpureum (Dalea purpurea)

Plant Characteristics
Several branching stems grow from a woody taproot. The leaves consist of 3-7 linear leaflets. Small rose-purple flowers are clustered on a thick spike. Small one or two-seeded pods.

Mature Height
1' to 3'

Flowering Period
Starts greening in mid to late spring and produces flowers from late May to July.

Growth Rate
NA

Available Plant Forms
Seeds or plants

Exposure
Sun to partial shade

Water Needs
Low to moderate. Moderately drought tolerant. Prefers well-drained soils

Wetland Indicator
Upland

Soils
Clay loams to loamy sands. Can grow on moderately alkaline soils

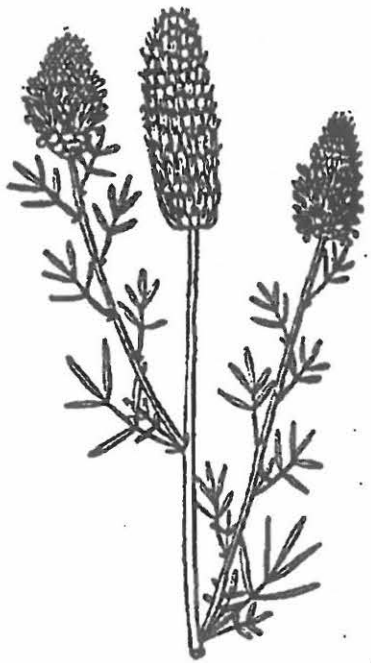
Habitat Characteristics
Commonly found on the plains from the base of the foothills eastward. Can be found in open woodlands. Associated with mixed and tallgrass prairie species such as big and little bluestem, and sideoats grama.

Landscape Use
Use with native grasses in revegetating slopes and dry prairie. Can be planted in open woodlands such as grassy areas under cottonwoods on the upper banks of streams. Small plants can be scattered through a grassland seeded area.

Management Concerns
Seeds should be inoculated when planting on sites lacking any prairie clover history. Drill scarified seed before the moistest growing season.

Zone
Plains

Wildlife Value
Some value to birds and small mammals. Seedlings eaten by small mammals.



Sandverbena, snowball - *Abronia fragrans*

Plant Characteristics
Long, dark red stems spread across the ground. The fleshy, forest-green leaves contrast with the small white flowers that are clustered in a large ball.

Mature Height
Up to 2', spreading.

Flowering Period
Blooms mid to late summer

Growth Rate
NA

Available Plant Forms
Seeds

Exposure
Sun

Water Needs
Adaptable

Wetland Indicator
Upland

Soils
Sandy

Habitat Characteristics
This lovely flower grows in sandy soils across the plains.

Landscape Use
Plant in sandy grasslands to provide color and attract butterflies.

Management Concerns
NA

Zone
Plains

Wildlife Value
Provides nectar for butterflies and bees

Sunflower, Common -
Helianthus annuus

Plant Characteristics
Robust, very tall annual with large heart-shaped leaves growing on a thick stem. The yellow flowers have dark centers up to 4" wide. This is the wild ancestor of cultivated varieties.

Mature Height
10'

Flowering Period
May to August

Growth Rate
Establishes easily.

Available Plant Forms
Seeds

Exposure
Full sun

Water Needs
Dry to moderate. Drought tolerant

Wetland Indicator
FACU

Soils
Adaptable

Habitat Characteristics
Often found in large colonies in disturbed sites such as roadsides and abandoned farm fields.

Landscape Use
Attractive plant for areas where quick growth is needed. Plant in seed mix with slower growing grasses to provide early plant growth while the grasses get established.

Management Concerns
Tends to be weedy.

Zone
Foothills, plains

Wildlife Value
Seeds eaten by a wide variety of animals. Muskrats and deer eat the plants. Host for larval butterflies.

Water Plantain -
Alisma plantago-aquatica (triviale)

Plant Characteristics
Oval, parallel leaves form a loose cluster. From the leaves arises an upright flower stalk scattered with small white or pink flowers.

Mature Height
12" to 18"

Flowering Period
Summer

Growth Rate
NA

Available Plant Forms
Plants

Exposure
Sun

Water Needs
Saturated soils to standing water

Wetland Indicator
OBL

Soils
NA

Habitat Characteristics
In standing water or mud flats from the plains to the mountains

Landscape Use
Grow in areas of shallow standing water or on muddy shores. Plant with arrowhead surrounding taller plants such as cattails and bulrushes.

Management Concerns
NA

Zone
Plains, foothills.

Wildlife Value
NA

WHW WSW

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Glossary

Alkaline (sodic)
A soil with a high pH (low acid content), and high alkali content.

Bare Root
Plants without soil around their roots.

Best Management Practices (BMPs)
Economically feasible conservation practices and management measures (see City of Boulder Wetlands Protection Program Best Management Practices).

Bract
A small leaf-like structure, usually attached to a flower.

Buffer Zone
A moist area of vegetation used as a neutral zone between development or dry land and a wetland. In the City of Boulder, a buffer zone is a regulated area with boundaries determined according to criteria set forth in Ordinance 5521 § 9-12-4(f).

Containers
Various size pots or trays containing soil and plants suitable for transplanting.

Cuttings
Sections of plants that are cut and placed in water.

Forbs
Herbaceous vegetation other than grass and grass-like plants.

Foothills
Low hills at or near the foot of a mountain range.

Herbaceous
Non-woody vegetation: grasses, grass-like plants and forbs.

Hybrid
Offspring of two different species.

Hydric
Plants adapted to saturated soils.

Hydrology
The study of water.

Jurisdictional Wetland
A wetland that meets the U.S. Army Corps of Engineers criteria for wetlands set forth in the 1987 Corps of Engineers Wetland Delineation Manual.

Marshes
A wetland of inundated to saturated soils covered with herbaceous vegetation.

Mesic
Moist.

Plains
The rolling grasslands east of the foothills.

Plugs
Small plants that have been started in trays and are ready to transplant.

Poles
A tree branch that can be re rooted.

Rhizome
An underground stem that acts as a root. Rhizomatous (adj.).

Saline
High salt concentration.