

**NATURAL RESOURCES CONSERVATION SERVICE**  
**CONSERVATION PRACTICE SPECIFICATION**  
**RIPARIAN HERBACEOUS COVER**

(Ac.)

**CODE 390**



Image 1. Herbaceous riparian planting: carex sp. (sedge) mat.

**DEFINITION**

**Herbaceous Riparian** is an ecosystem that occurs along watercourses or water bodies that function as a transitional zone to the associated upland. This system consists almost entirely of herbaceous vegetation (grass and grass-like plants) adapted to periodic flooding or saturated soils.

Despite their naturally limited extent in the arid southwest, these ecosystems support some of the greatest diversity of plant and animal communities. Other valuable functions include: improved water quality (by reducing sediments and pollutants); increased water storage; increased net carbon in the soil biomass and improved soil stability.

*Herbaceous Riparian vs. Herbaceous Wetland*

The terminology for both systems is often used interchangeably. The separating factor is that an herbaceous wetland meets "wetland criteria" where an herbaceous riparian may not meet this criteria.

For the purposes of this practice, it is not required that the herbaceous riparian meet wetland criteria.

For herbaceous wetlands, also refer the NRCS conservation practice Wetland Enhancement (code 659) and Wetland Restoration (code 657).

**CONDITIONS WHERE PRACTICE APPLIES**

This section provides further clarification on the criteria provided in the 390 practice standard.

*"Areas adjacent to perennial to intermittent watercourses or water bodies, where the natural plant community is dominated by herbaceous vegetation, that is tolerant of periodic flooding or saturated soils."* NRCS 390 practice standard.

**Water Regime:** At a minimum, the site must have intermittent hydrology. Intermittent watercourses contain flowing water for part of the year; they are often marked on topographic maps with a line of blue dashes and dots. Intermittent water bodies have surface water present for variable periods without detectable seasonal periodicity (weeks, months, or even years may occur between periods of inundation).

- For intermittent sites, the herbaceous riparian will extend to the center of the channel or basin.

**Natural Plant Community:** The site must naturally have the capability to support an herbaceous riparian plant community.

Note: this determination can be complex, refer to the planning section for more information.

**Vegetation:** Herbaceous vegetation is defined as a plant without a persistent woody stem, with all perennating or overwintering organs below the ground. These include grasses, sedges, rushes, ferns, legumes, and non-woody forbs.

Those occurring in the riparian zone are adapted or tolerant to the site's water regime. This can range from a plant that must be wholly or partially submerged in water (hydrophyte) to an upland plant that can tolerate short durations of inundation or soil saturation.

## PLANNING

### *Determine the Geomorphic Potential*

Conduct a geomorphic assessment in enough detail to 1] determine if/where there is potential to support a riparian herbaceous plant community, and to 2] determine the maximum sustainable width of the herbaceous riparian zone, and to 3] determine site hydrology.

In most cases, this can be accomplished by basic surveying techniques and comparison with a reference site.

#### Key items to survey:

- Average water elevation (required)
- Bankfull discharge elevation (required)
- Overbank elevation
- Flood prone elevation

#### Using a reference site:

- Find a site within the targeted ecoregion which represents the least-impaired, best condition attainable. These are not always pristine sites. Ensure climate, elevation and hydrology is similar to the project area.
- Record the plant species and where they occur within the riparian and hydrologic zones.
- In some cases, it may be beneficial to survey the reference site.
- Identify if the site can be used as a potential plant harvest location.
- If a reference site cannot be found or it's inaccessible: use the appropriate riparian Ecological Site Description (ESD) if one is available; the Handbook of Wetland Vegetation Communities of New Mexico (Estaban, 2000); or other available resources.

*Criteria 1:* For waterways, evaluate the stream condition to identify if channel and streambank stability is adequate to support this practice. Use the USDA-NRCS Stream Visual Assessment Protocol (SVAP2) or consult a specialist.

Where instability occurs, use NRCS conservation practices: Stream Habitat Improvement and Management (code 395) or Streambank and Shoreline Protection (code 580) prior to, or in conjunction with, this practice.

*Criteria 2:* Determine if there are functional, subsurface drains (i.e. drain tiles) affecting the site. If present, they must be disabled or replaced with non-perforated pipe or otherwise altered to ensure the site hydrology is restored.

### Riparian Zones

As part of the geomorphic assessment, the riparian

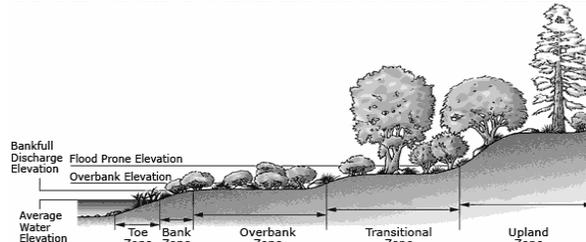


Figure 1: General depiction of a riparian zone. Not all riparian areas look like this one; some zones may be absent. (Hoag, 1999)

**Toe zone:** Located below the average water elevation.

**Bank zone:** Lies between the average water elevation and the bankfull discharge elevation.

**Overbank zone:** From bankfull discharge elevation to overbank elevation.

**Transitional zone:** Extends from overbank elevation to flood prone elevation.

**Upland zone:** Above flood prone elevation.

The toe and bank zones are the primary location for the herbaceous riparian plant community. The overbank zone may also support this community, depending upon the natural geomorphic setting and influencing factors. Use the reference site to help make this determination.

NOTE: Not all streambanks and floodplains are represented by a gradual slope, and not all systems will have all the above mentioned riparian zones.

### Hydrologic Zones

Within the herbaceous riparian zone, identify the hydrologic zones based on the depth of the water. This is a critical distinction to make as emergent vegetation is adapted to specific water regimes.

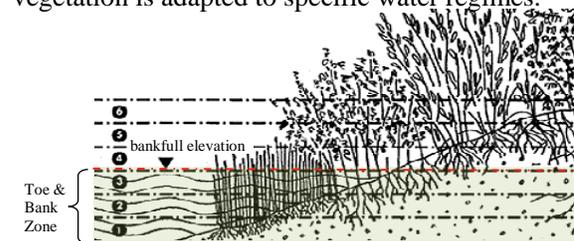


Figure 2: Hydrologic zones. Modified from Ogle and Hoag 2000.

① **Flooded:** Surface water covers the land surface throughout the year in all years or persists throughout the growing season in most years. When surface water is absent, the soils are saturated within the upper 6 inches of the soil profile. Vegetation is obligate hydrophytes (OBL).

② **Saturated:** Soils remains saturated near the surface for most of the growing season, with brief or seasonal periods of inundation. Vegetation is hydrophytes (often OBL/FACW).

③ **Fringe:** Surface water or soil saturation is present for brief periods during growing season, but the water table usually lies well below the soil surface. Has moist soil.

④ **Overbank:** Surface water is present for variable periods (flooding), and the saturation zone is deep within the profile.

**PLANNING (cont.)*****Determine the Planting Locations***

Based on the purpose of the herbaceous riparian cover and the site potential (as identified by the geomorphic assessment), identify which herbaceous riparian zones will be restored, enhanced or established by planting.

**Entire Planting.** Due to the narrow nature of these communities, it is common that the entire potential herbaceous zone is planted. In many cases, there will be desirable plants already established within the planting area; those will be identified, left intact, and planted around.

**Zone Planting.** In other cases, only one or more of the zones is in a degraded condition and in need of planting.

**Selective Planting.** On healthier sites, it may be identified that only sections of zones are in a degraded condition and in need of planting. This commonly occurs where areas have been disturbed (e.g. previous livestock access points, abandoned vehicle water crossings or stabilized scour areas).

Wherever possible, address all locations which have a degraded herbaceous plant community.

Determine the area (sqft) for each hydrologic zone within the planting area.

$$\text{Length (ft)} \times \text{width (ft)} = \text{square feet to be planted}$$

***Select Plant Species***

For each hydrologic zone, select one or more plant species based on the following 390 criteria:

1. Use only perennial species.
2. Species must be adapted to site and hydrologic conditions.
  - Match the natural vegetation; as identified on-site or at the reference site, and by using the sites ESD and other reference sources.
  - Use the hydrologic zones to ensure species selection will match the onsite water regime.
  - Local ecotypes will be used wherever possible (i.e. harvest from a nearby source).
  - If plants are purchased, ensure they are propagated at a similar elevation and climate as the project area. Ensure they are viable and of high quality. Ensure scientific names are provided; invasive, ornamental species are often sold as herbaceous riparian plants. Ensure they have mycorrhizal inoculation (when needed).

3. Species must provide structural & functional diversity for the fish/wildlife likely to benefit from the cover. Some examples:

- In the toe zone, select plants which will "overhang" into the water; this provides valuable shade and food sources (seeds, insects) for aquatic organisms.
- Select plants with a taller vertical structure (>12" inches) to provide concealing cover.
- Select plants which provide a high yield of nutritious seeds beneficial to wildlife.
- Select plants with pollinator value.

4. Native species will be used wherever possible (however, native species are required if wildlife habitat is a purpose for the practice).

Where available, use the Ecological Site Descriptions (ESD's) to guide the selection of species. Refer to [NM FOTG Section II - ESD](#).

Another data source is the NMNHP [Handbook of Wetland Vegetation Communities of New Mexico](#).

[Appendix 1](#) lists herbaceous plants commonly recommended for New Mexico's riparian systems. This list is not intended to be comprehensive; other appropriate species may be selected.

***Natural Regeneration:***

Where native seeds and other propagules (i.e. corms, tubers, and rhizomes) are present, natural regeneration can be used in lieu of planting.

- Only use this method where natural regeneration can be expected to reach its full potential (healthy and functioning) within two years.

Consult with a riparian ecologist to assist in making this determination, and to provide guidance on conservation measures which will promote natural regeneration.

*Example:* A geomorphic assessment determines that the primary stressor on the plant community is heavy grazing by elk and livestock and that the native vegetation is stunted and sparse but consists of quick colonizing species. Recommended conservation measures include: excluding livestock until the community can recover (approx. two years), followed by a prescribed grazing plan with timing and duration specific to maintaining riparian plant health. During the establishment period, weed scouting and control is prescribed, and monitoring used to assess the elk impacts.

**ESTABLISHMENT: Planting Plugs**

Terminology. A "plug" refers to a mature, herbaceous wetland/riparian plant with intact root mass and associated soil, which has been harvested by extraction from the soil or is container grown. The plug may contain one plant or a grouping of several plants. Typical plug size for a commercially grown plant is 2.0 in/dia. and 6-10 inches deep. Typical size for a field harvested plug is 6.0 x 6.0 in/dia. (generally a spades width) and 6.0 inches deep. A "mat" refers to a large sized, field harvested plug. Typical mat size is 1.0 x 1.0 ft/dia. and 6.0 inches deep. Plugs are also commonly referred to as "wildlings" or "sprigs".



Timing. Transplant during the growing season; preferably just after peak flows, when water levels are gradually dropping, or in late summer during the wet season. Avoid transplanting during hot, dry conditions (i.e. mid-summer or during a drought). Avoid planting when the site will be covered by more than 6.0 inches of surface water within the first two months.

Planting Density. Planting density will affect the rate at which the plants cover the area, and it should be determined by the site conditions and intended purpose of this practice.

- The minimum requirement is one plug planted every 2.5 square feet.

Rapid vegetation coverage may be critical in the following instances and will require a higher planting density:

- 1) Where using for erosion control, phyto-stabilization, or bank stabilization (bio-engineering). Plugs should be placed, in high density, along the entire radius of the project waterway. High density is best achieved by using mats, placed adjacent to each other (with little to no space in-between) or one plug every 0.5 feet (2 plugs every square foot).
- 2) Where there is bare ground or survival rate is expected to be low; use mats in the Toe Zone and plant a high density of plugs in the Bank Zone (1-2 plugs/sqft). Consider using a combination of transplants and seeding.
- 3) Where existing, desirable vegetation is sparse; plant plugs at a higher density (1-2 plugs/sqft) planted in-between the existing vegetation.

Plug Planting/Transplanting Technique:

**Step 1: Site Preparation.**

Plugs should be installed where soils are saturated or the water depth is 1 to 2 inches (no more than 4" deep); this is the Toe Zone and Bank Zone. At a minimum, the bottom portion of the roots should be in contact with the saturation zone.

Identify the exact planting sites, to match the hydrologic establishment needs of the selected plant. Cross-reference the section on [Hydrologic Zones](#) with the species list in [Appendix 1](#).

**Table 1. Planting Guidance by Hydrologic Zone**

Zone 1 - Flooded	Soils should be kept saturated with no more than 6" of standing water at any time until the plants are rooted (usually 4-5 weeks). Fluctuating water levels during the establishment year will facilitate growth and natural spread.
Zone 2 - Saturated	Soils should be kept saturated with no more than 1"- 2" of standing water at any time until the plants are rooted (usually 4-5 weeks). Fluctuating water levels during the establishment year will facilitate growth and natural spread.
Zone 3 - Fringe	Soils (at a depth of 0 to >12" deep) should be kept saturated or moist through the first growing season.
Zone 4 - Overbank	Soils (at a depth of 6 to >12" deep) should be kept saturated or moist through the first growing season.

At each planting location, create a depression in the soil that will accommodate the dimensions of the plugs/mats. The depression should be lightly scarified and have loosened soil to a depth of at least 6 inches. Large clumps of soil should be broken up, and any rocks, roots, or other debris that would create air pockets should be removed.

- Prepare the transplant area, before collecting the plugs from the donor site.

**Step 2: Plug Collection (if applicable).**

Ensure necessary authorizations, permits, or permissions for plant removal are obtained.

Dig out plugs by hand with a shovel, spade, or other appropriate plant harvester. Gently lift the plug out to keep as much of the soil surrounding the root system attached.

**Harvesting Plugs**



Spade or shovel method



Plug harvester tool method

**ESTABLISHMENT: Planting Plugs (cont.)****Step 2: Plug Collection (cont.).**

*Minimize harvest impact to the donor site:*

- Harvest from the edge of a donor patch to minimize damage to other plants.
- Take only a few plants from each donor site to disperse the impact; do not take more than a ¼ of the overall donor site (i.e. no more than 1.0 sqft harvested per 3.0 sqft area).
- Dig down deep enough to ensure a majority of the root system will remain intact, but avoid harvesting past 6.0 inches deep.
- Rehabilitate the donor site by filling in the hole with soil and smoothing to the natural grade.
- Do not collect from a site that is vulnerable to weed infestation, or has noxious weeds; to avoid spreading the weeds to the transplant site, and to avoid weed establishment at the donor site where the soil was disturbed.

*Never collect in such a way that your actions change the composition of the donor community.*

Exception: Harvest all plants possible at sites where construction activities will result in plant mortality (such as streambank sloping).

**Planting Divisions**

Some plants can have the foliage and corresponding root system divided. This process works with plant propagated by rhizomes, stem tubers, and tuberous roots. The entire plant may be removed and then divided, or part of the mother plant removed and the rest left in place to continue growing. Planting techniques are the same as those described for plugs.



Photo by Chris Hoag

**Step 3: Transplant.** The excavated plug should be placed in the prepared depression, so that the top of the plug's soil is flush with the surrounding ground. Excavate or fill the depression and re-set the plug, as needed. The edges of the plug should not be exposed; fill in the edges with soil as needed to protect the roots from air exposure. Lightly tamp down the plug so that it is in direct contact with the soil; the most effective way is to walk across the planting area. Do not jump, stomp, or drive heavy equipment across the planting to tamp it down; do not compact the soil.

Water the planting site to further eliminate air pockets. If the top growth of the plug is dense, trim the shoots back by 1/4 to compensate for root loss and to promote root growth.

- The plug should be transplanted within 30 minutes of being harvested. Do not allow the plug to dry out, apply water as needed.
- Use gloves, some stems/leaves can be sharp.

**Staking.** When planting on a slope (such as the bank edge) it is recommended to stake each mat; using 16" long stakes driven through the middle of the mat anchoring it to the soil. The stakes should be driven at a slight angle, leaving approximately 4" of the stake above ground (see Image 1).

**Post Transplant:** If water needs are met throughout the first month (see Table 1); the plugs should be securely rooted within 4 to 5 weeks after planting. When the plants are well established they can tolerate deeper water or drier conditions.

**Operation and Maintenance:** The following actions shall be carried out in addition to the O&M requirements listed in the practice standard:

- Replacement of plugs will be required until the intended functions of the practice are accomplished.

**Establishment References**

Hoag, JC, Tilley, D, Ogle, D. and L. St. John. 2011. [PMC Technical Note 38: Description, Propagation, and Establishment of Wetland-Riparian Grass and Grass-like Species of the Intermountain West](#). IDPMC, Boise, Idaho. 68p.

**PROTECTION**

The project area must be protected, to the extent practicable, until well established. Well established is broadly defined as the point in time where the plant community is self-maintaining and functioning to its highest potential. Generally the establishment period takes two to five years depending upon the site conditions and the restoration and management actions taken.

**Use Exclusion.** Newly planted areas are vulnerable to damage, especially from trampling, browsing or grazing on the tender new growth. Until the plants have matured and established, it is required to protect the plantings from livestock access.

## PROTECTION (cont.)

Consider using NRCS practice Fence (Code 382) to develop a wildlife-friendly fence to allow livestock exclusion during the establishment period and during sensitive periods after the establishment period (i.e. when soils are saturated, during high-flows, and during critical nesting, fawning or pollinating periods).

Consider using NRCS practice Watering Facility (Code 614) to provide an off-site water source, as needed, to facilitate exclusion from the waterway.

Competing Vegetation. Competing vegetation may need to be controlled until the herbaceous planting becomes well established. Competing vegetation is defined as any vegetation that interferes with the establishment of the planted species or of desired regeneration.

Common control methods include mechanical (i.e. spot mowing) or hand treatments (i.e. pulling, hoeing). If using grazing to control competing vegetation, ensure that the prescribed grazing plan is developed with specific guidance to meet this objective. If using chemical control methods, follow the guidelines provided in NRCS practice Herbaceous Weed Control (Code 315).

## REFERENCES

- Beddoes, J., D. Ogle, R. Sampson and C. Hoag. 2007. [Riparian Buffer Design and Species Considerations](#). USDA NRCS, Boise, Idaho. June 2007. 20p.
- Bentrup, G and J.C. Hoag. 1998. [The Practical Streambank bioengineering Guide: a User's Guide for Natural Streambank Stabilization Techniques in the Arid and Semi-arid Great Basin and Intermountain West](#). Interagency Riparian/Wetland Project. Plant Material Center, USDA-NRCS, Aberdeen, ID.
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- Johnston, Barry C. 2001. [Field guide to sedge species of the Rocky Mountain Region: The genus \*Carex\* in Colorado, Wyoming, western South Dakota, western Nebraska, and western Kansas](#). Renewable Resources R2-RR-01-03. Denver, CO: U. S. Department of Agriculture, Forest Service, Rocky Mountain Region. 290 pp.
- Native Plant Network. 2013. [Propagation Protocol Database](#). <http://www.nativeplantnetwork.org/>
- Schultz, R.C., J.P. Colletti, T.M. Isenhardt, W.W. Simpkins, C.W. Mize, and M. L. Thompson. 1995. Design and placement of a multi-species riparian buffer strip. *Agroforestry Systems* 29:201-225.ts.
- USDA, NRCS. "Stream Visual Assessment Protocol". Technical Note 99-1. NRCS National Water and Climate Center.

**Appendix 1 - Common Plants Used for Herbaceous Riparian Restoration/Enhancement in New Mexico (perennial, native species only)**

Scientific Name	Common Name	National Wetland Plant Inventory <sup>1</sup> (2012)	Growth				Life Zones					Site Condition		Hydrologic Zones <sup>21</sup>					Practice 390 Purposes					Availability				
			Bunch	Short Rhizomes	Long Rhizomes	Avg. Plant Height (in.)	Elevation Range (ft.)	Subalpine	Montane	Foothills	Plains/Prairie	Open Sites	Shaded Sites	Soil pH Range	Zone 1*	Zone 2	Zone 3	Zone 4	Tolerates Brief Dry Periods	Fish-Wildlife	Livestock Forage Value	Pollinators (nectar/pollen)	Carbon Storage/Biomass	Contaminant Remediation	Streambank Stability	Field Harvest (plugs/division)	Commercially Available (seed)	Commercially Available (plug)
<b>SEDGES</b>																												
<i>Carex aquatilis</i>	water sedge	OBL	X		X	14-27	6,000-11,000	X	X			X	4.0-7.5	①	②			X	X	X		X	X	X	X	X	X	X
<i>Carex athrostachya</i>	slenderbeak sedge	FACW	X			6-24	400-10,500	X	X	X		X	5.8-7.2		②	③			X	X		X			X	X	X	X
<i>Carex bebbii</i>	Bebb's sedge	OBL	X			10-20	3,000-10,000	X	X	X	X	X	4.6-7.0		②	③			X		X				X	X	X	X
<i>Carex emoryi</i>	Emory's sedge	OBL			X	16-40	<i>no data</i>			X	X	X	6.0-7.8		②	③		X	X		X			X	X		X	X
<i>Carex hystericina</i>	bottlebrush sedge	OBL	X	X		8-36	3,000-7,500		X	X	X	X	7.0-8.0		②	③		X	X		X			X	X	X	X	X
<i>Carex microptera</i>	smallwing sedge	FAC	X	X		8-16	4,500-11,500	X	X			X	5.6-7.4			③	④	X	X				X		X	X	X	X
<i>Carex nebrascensis</i>	Nebraska sedge	OBL		X	X	10-24	3,500-10,800		X	X		X	5.7-7.4	①	②				X	X		X	X	X	X	X	X	X
<i>Carex pellita (C.lenticularis)</i>	woolly sedge	OBL	X	X		11-36	3,000-10,200	X	X			X	7.0-8.0	①	②				X	X		X		X	X	X	X	X
<i>Carex praegracilis</i>	clustered field sedge	FACW			X	8-24	3,300-10,600		X	X	X	X	5.3-6.8			③	④	X	X			X		X	X	X	X	X
<i>Carex scoparia</i>	broom sedge	FACW	X	X		30	6,500-9,500		X	X	X	X	4.6-6.9		②	③			X			X			X	X	X	X
<i>Carex senta</i>	swamp carex	OBL	X		X	18-30	2,000-9,500		X	X	X	X	5.0-8.0		②	③			X			X			X	X	X	X
<i>Carex simulata</i>	analogue sedge	OBL			X	18	6,200-10,000	X	X	X		X	6.0-7.5		②	③		X	X	X		X			X	X	X	X
<i>Carex stricta</i>	upright sedge	OBL	X	X		12-48	<i>no data</i>			X	X	X	3.5-7.0		②	③		X	X	X		X		X	X	X	X	X
<i>Carex stipata</i>	owlfruit sedge	OBL	X	X		40	6,500-9,500		X	X		X	4.9-7.9	①	②	③			X			X			X	X	X	X
<i>Carex utriculata</i>	beaked sedge	OBL		X	X	12-42	3,500-11,000	X	X	X		X	5.7-7.7	①	②			X	X	X		X	X	X	X	X	X	X
<i>Carex vulpinoidea</i>	fox sedge	OBL/FACW	X	X		8-38	2,000-5,600			X	X	X	6.8-8.9		②	③		X	X	X		X		X	X	X	X	X
<b>SPIKERUSHES / RUSHES / BULLRUSH</b>																												
<i>Eleocharis acicularis</i>	needle spikerush	OBL			X	6-18	5,000-12,000					X	4.5-7.0		②	③		X	X						X	X	X	X
<i>Eleocharis palustris</i>	common spikerush	OBL			X	6-30	3,400-10,700					X	4.0-8.0	①	②	③			X	X		X		X	X	X	X	X
<i>Eleocharis parishii</i>	Parish's spikerush	FACW			X	8-12	0-6,500					X	--	①	②	③									X	X	X	X
<i>Juncus arcticus</i>	mountain (baltic) rush	OBL/FACW			X	6-30	0-11,500			X	X	X	6.0-9.0	①	②	③					X			X	X	X	X	X
<i>Juncus effusus</i>	common rush	OBL	X		X	12-48	0-8,000			X		X	5.5-8.8		②	③	④	X	X			X	X	X	X	X	X	X
<i>Juncus interior</i>	inland rush	FAC	X			36	3,500-8,400			X	X	X	5.7-7.0		②	③	④	X	X						X		X	X
<i>Schoenoplectus americanus</i>	chairmaker's bulrush	OBL			X	24-48	3,800-9,300			X	X	X	5.7-7.5	①	②				X			X			X	X	X	X
<i>Schoenoplectus maritimus</i>	Alkali bulrush	OBL			X	24-36	1,000-11,500			X		X	4.0-7.0	①	②				X			X		X	X	X	X	X
<i>Schoenoplectus tabernaemontani</i>	softstem bulrush	OBL			X	6'	1,000-9,000			X		X	5.4-7.5	①	②				X			X		X	X	X	X	X
<i>Schoenoplectus acutus</i>	hardstem bulrush	OBL			X	6'	1,000-9,000			X		X	5.2-8.5	①	②				X			X		X	X	X	X	X
<i>Scirpus microcarpus</i>	panicked bulrush	OBL			X	42	4,500-8,600			X		X		①	②	③			X			X		X	X	X	X	X

**This list is not intended to be comprehensive; other appropriate species may be selected.**

Note: all sedges and rushes are considered to be cool season plants.

<sup>11</sup> National Wetland Plant Inventory: [http://wetland\\_plants.usace.army.mil](http://wetland_plants.usace.army.mil)

<sup>21</sup> Hydrologic Zones. Refer to the NRCS Practice Specification 390-Herbaceous Riparian.

**Appendix 1 - Common Plants Used for Herbaceous Riparian Restoration/Enhancement in New Mexico (perennial, native species only)**

Scientific Name	Common Name	National Wetland Plant Inventory <sup>1</sup> (2012)	Growth			Life Zones				Site Condition		Hydrologic Zones <sup>21</sup>				Practice 390 Purposes						Availability					
			Bunch	Short Rhizomes	Long Rhizomes	Avg. Plant Height (in.)	Elevation Range (ft.)	Subalpine	Montane	Foothills	Plains/Prairie	Open Sites	Shaded Sites	Soil pH Range	Zone 1*	Zone 2	Zone 3	Zone 4	Tolerates Brief Dry Periods	Fish-Wildlife	Livestock Forage Value	Pollinators (nectar/pollen)	Carbon Storage/Biomass	Contaminant Remediation	Streambank Stability	Field Harvest (plugs/division)	Commercially Available (seed)
<b>GRASSES</b>																											
<i>Achnatherum hymenoides</i>	Indian ricegrass	FACU/UPL	X		12-24"	4,000-9,500					X	6.6-8.9			③	④	X	X	H						X	X	
<i>Beckmannia syzigachne</i>	Amer. sloughgrass	OBL	X		36"	4,500-10,600					X	X	5.5-7.5		②	③		X	X	L		X		X	X	X	
<i>Calamagrostis canadensis</i>	bluejoint	FACW		X	24-36"	4,500-11,500					X		4.5-8.0		②	③	④	X	X	H		X		X	X	X	X
<i>Deschampsia cespitosa</i>	tufted hairgrass	FAC/ FACW	X		18-30"	5,000-13,000					X	X	4.8-7.2			③		X	X	L		X	X	X	X	X	X
<i>Distichlis spicata</i>	inland saltgrass	FAC/FACW	X		4-12"	0-9,000					X		6.4-10.0			③	④	X	X	L				X	X	X	X
<i>Glyceria grandis var grandis</i>	Amer. mannagrass	OBL	X		48-60"	5,000-9,000					X	X	4.0-8.0	①	②			X	X	H		X		X	X	X	X
<i>Glyceria striata</i>	fowl mannagrass	OBL	X		48-60"	3,500-10,500					X	X	4.0-8.0	①	②			X	X	H		X		X	X	X	X
<i>Leymus cinereus</i>	basin wildrye	NI	X		36-60"						X		5.6-9.0			③	④	X	X	H		X		X	X	X	
<i>Muhlenbergia asperifolia</i>	scratchgrass	FACW	X		18-24"	180-8,000					X	X	6.0-8.4			③	④	X	X	L				X	X	X	X
<i>Panicum virgatum</i>	switchgrass	FAC/FACW	X	X	12-24"	3,400-7,800					X		4.5-7.5			③	④	X	X	H		X		X	X	X	X
<i>Pascopyrum smithii</i>	western wheatgrass	FAC		X	24"	1,000-9,000					X		4.5-9.0			③	④	X	X	M		X		X	X	X	
<i>Phleum alpinum</i>	alpine timothy	FAC	X		12-18"	7,800-13,000					X	X	5.0-7.5			③	④	X	X	H		X		X	X		
<i>Puccinellia nuttalliana</i>	Nuttall's alkaligrass	OBL	X		6-12"	3,000-9,500					X		6.5-8.5		②	③		X	X	L				X	X	X	
<i>Schizachyrium scoparium</i>	little bluestem	FACU	X		24-36"	--					X		5.6-8.4				④	X	X	H		X		X	X		
<i>Sorghastrum nutans</i>	Indiangrass	UPL	X		36- 72"	3,500-6,800					X		4.8-8.0				④	X	X	H		X		X	X		
<i>Spartina gracilis</i>	alkali cordgrass	FACW		X	24-36"	4,000-9,000					X		7.0-9.5		②	③		X	X	M		X		X	X		
<i>Spartina pectinata</i>	prairie cordgrass	FACW		X	36-60"	3,500-6,000					X		6.0-8.5			③	④	X	X	M		X		X	X		
<i>Sporobolus airoides</i>	alkali sacaton	FAC	X		3-12"	1,000-6,000					X		6.6-9.0			③	④	X	X	M		X		X	X	X	
<i>Sporobolus wrightii</i>	big sacaton	NI	X		48-66"	2,000-7,000					X		5.6-8.0			③	④	X	X	M		X		X	X	X	
<b>FORBS / LEGUMES</b>																											
<i>Anemopsis californica</i>	yerba mansa	OBL/ FACW	X		8-12"	<6,500					X		6.5-9.0		②	③		X	X		X			X	X		
<i>Asclepiasin carnata</i>	swamp milkweed	OBL/FACW		X	36-60"	3,000-6,000					X		5.0-8.0		②	③	④	X	X		X	X		X	X	X	
<i>Asclepias speciosa</i>	showy milkweed	FAC		X	36-48"	0-6,250					X		5.0-7.0			③	④	X	X		X	X		X	X	X	
<i>Helianthus nuttallii ssp. nuttallii</i>	Nuttall's sunflower	FACW		X	60-70"	4,000-8,850					X		--		②	③		X	X		X					X	
<i>Lobelia cardinalis</i>	Cardinal flower	OBL/FACW	S		30-60"	1,500-5,250					X	X	5.8-7.8			③	④	X	X		X			X	X		
<i>Mimulus guttatus</i>	seep monkey flower	OBL/ FACW	X		12-30"	0-10,000					X	X	6.0-8.0		②	③		X	X		X			X	X		
<i>Oenotheraelata ssp. hirsutissima</i>	Hooker's primrose	FACW	S		15-30"	0-9,200					X		7.0-8.0			③	④	X	X		X					X	
<i>Potentilla gracilis</i>	slender cinquefoil	FAC	X		15-30"	400- 11,500					X		4.0-7.5			③	④	X	X		X			X	X		
<i>Ranunculus cymbalaria</i>	alkali buttercup	OBL	S		2-12"	0-10,500					X	X	6.5-8.0			③	④	X	X		X					X	
<i>Sidalcea neomexicana</i>	salt checkerbloom	FACW	S		24-48"	--					X	X	6.2-7.8		②	③		X	X		X					X	
<i>Sparganium eurycarpum</i>	Broad fruit bur-reed	OBL		X	24-48"	3,400-7,500					X	X	5.0-8.5	①	②			X			X	X		X	X		
<i>Symphyotrichum lanceolatum</i>	white panicle aster	OBL/ FACW		X	48-60"	--					X	X	5.8-7.4			③	④	X	X		X			X	X		
<i>Verbena hastata</i>	swamp verbena	FAC/FACW		X	18-48"	3,000-6,000					X		--		②	③		X	X		X					X	
<b>This list is not intended to be comprehensive; other appropriate species may be selected.</b>																											