

## Evaluation of Wet Meadow Restorations in the Platte River Valley

Kent Pfeiffer

Platte River Whooping Crane Maintenance Trust, Wood River, NE 68883

*Abstract.* The mission of the Platte River Whooping Crane Maintenance Trust is to protect and manage habitat in the Platte valley for whooping cranes, sandhill cranes, and other migratory birds. The plan for meeting this mission calls for the creation and maintenance of eleven habitat complexes distributed through the central Platte valley. Each habitat complex is intended to consist of 1000 hectares of wet meadows and adjacent roost habitat of unvegetated river channel. Since approximately 75% of Platte valley wet meadows have been converted to crop land there is not enough existing wet meadow habitat to meet the requirements of the habitat complex plan. Consequently, restoration of areas to wet meadow-type vegetation is necessary. Over the past 17 years, the Trust has attempted a variety of restoration techniques on 485 hectares of its lands. These restoration techniques fall into three basic categories: 1) low diversity (3-6 species) CRP-type grass plantings on former crop fields; 2), cleared riparian forests; and, most recently, 3) high diversity (100+ species) plantings on former crop fields, including land surface recontouring to create ridge and slough topography typical of native meadows. We are evaluating the restored areas to determine the relative success of the various techniques in creating vegetation that resembles the vegetation of native meadows. In spite of being done relatively recently (< 5 years) the high diversity plantings are already developing vegetation that more closely resembles native sites than either the low diversity plantings or the cleared forests, many of which are more than 10 years old. Based on these results, future restoration efforts should continue to focus on the high diversity technique.

## Introduction

The "Big Bend" reach of the central Platte River valley (the 70 mile stretch from Overton, NE to Chapman, NE) has hemispherical significance as a staging area for migratory birds. The region is best known for the nearly one-half million sandhill cranes (*Grus canadensis*) and several million ducks and geese that migrate annually through the region (Sidle et al. 1993). In total, approximately 300 species of birds use the woodlands, wet meadows, and river channel in the valley (Currier et al. 1985).

At the time of settlement, the Platte River was characterized by having several wide braided channels with wet meadows adjacent to and between the channels. Trees were sparse and present as scattered clumps along some of the river banks. However, over the past century the central Platte River valley has undergone a substantial transformation. Numerous dams and water diversions in Wyoming, Colorado, and western Nebraska have significantly reduced natural flows and sediment discharge. ). Peak discharge has declined nearly 70% and the river channel is only 10-70% of its 1865 width (O'Brien and Currier 1987). Once wide and treeless channels have been transformed to multiple, narrow channels with woody vegetation succeeding on stabilized sandbars (Sidle et al. 1989, MacDonald and Sidle 1992). Approximately 75% of native wet meadows associated with the river have been converted to crop land (Sidle et al 1989).

The Platte River Whooping Crane Trust was created in 1979 with the mission of acquiring and protecting habitat for migratory birds, whooping cranes in particular, in the central Platte valley. The habitat plan developed by the Trust calls for the protection of 1000 hectares of habitat in each of the eleven bridge segments between Overton and Chapman. Land acquisition efforts have focused on river channel and native wet meadows, as these are limited in availability and are considered to be the most critical habitats for many species of migratory birds, including whooping cranes. However, in the process of buying these habitats, adjacent crop fields are often included. Consequently, crop land makes up 880 hectares of the approximately 3600 hectares of land protected by the Trust to date. Many of these fields are marginally productive as crop land due to low fertility, high water tables, and/or high soil pH and are good candidates for wet meadow restoration. Additionally, in some bridge segments there are not enough existing wet meadows to meet the habitat goals.

To increase the availability of wet meadow habitat for migratory birds, the Trust and other conservation groups have begun efforts to restore areas to wet meadow-type vegetation. A variety of techniques were used for these restorations.

The earliest technique consisted of planting crop fields to low diversity (3-6 species) mix of native warm season grasses, primarily big bluestem (*Andropogon gerardii*), indiangrass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*). These were CRP-type (USDA Conservation Reserve





using ANOVA. Differences in means were examined with Student-Newman-Keuls Test at a significance level of  $P < .05$

## RESULTS AND DISCUSSION

Native Platte River wet meadows are characterized topographically by being relatively flat, but with series of sinuous, linear sloughs alligned roughly parallel to the river with adjacent areas of mesic prairie and/or sand ridges. Plant communities range from emergent aquatic vegetation in the bottoms of the deepest sloughs to Sandhills prairie on the highest ridges. Overall, reference meadows are dominated by warm season grasses and sedges & rushes. Cool season native grasses and conservative prairie forbs are relatively uncommon. Exotic species account for just over 10% of the vegetation on these sites. On average, a good quality native meadow will contain between 120 and 150

Many of the conservative prairie forbs have limited distributions and small populations in the Platte valley. They occur primarily on a handful sites that weren't subject to abusive management practices in the past. The relative abundance of conservative prairie species in the high diversity restorations compared to native sites is simply the result of a concerted effort to harvest seed from these species with the intent of establishing new and larger populations of them.

Plant species richness of the high diversity sites is equivalent to that of the native reference meadows (120-150 species).

#### Reclaimed Riparian Areas

None of the vegetation categories in the riparian areas were significantly different in cover values from those of the reference sites (Table 2). However, species richness of these areas was very low (less than 50 species) compared to either native meadows or high diversity restorations. What appears to have happened on these sites is that a few plant species typical of wet meadows, such as water sedge, prairie cordgrass, and tufted loosestrife were present as scattered patches within the woodlands. Once the overstory trees were removed, these plants rapidly expanded and now dominate the sites. Unlike native reference meadows, reclaimed riparian areas also have a high degree of shrub cover, primarily rough-leaved dogwood (*Cornus drummondii*) and indigobush (*Amorpha fruticosa*), that have proven difficult to control.

## CONCLUSIONS

Preliminary analysis of the data collected in this study indicates the high diversity planting technique offers the best potential for wet meadow restorations. The high diversity restorations have been completed more recently, and have had less time to develop than either the low diversity plantings or the reclaimed riparian areas. In spite of that fact, the high diversity restorations have already developed vegetation that more closely resembles native wet meadows than either of the other two restoration types.

Reclaiming riparian areas by removing trees offers some potential as an acceptable wet meadow restoration technique if an effective means of controlling shrubs can be developed. However, it may be necessary to seed these areas once the trees are removed to improve the diversity of the wet meadow plant community that will eventually develop there.

The low diversity grass planting technique offers the least value for wet meadow restoration. This technique is not recommended for future wet meadow restorations in the Platte valley.



## LITERATURE CITED

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**Table 1. Vegetation categories and the most common species in each category**

Categories	Common Name	Scientific Name
Warm Season Native Grasses	big bluestem	<i>Andropogon gerardii</i>
	indiangrass	<i>Sorghastrum nutans</i>
	switchgrass	<i>Panicum virgatum</i>
	prairie cordgrass	<i>Spartina pectinata</i>
	rice cutgrass	<i>Leersia orizoides</i>
Cool Season Native Grasses,	slender wheatgrass	<i>Agropyron caninum</i>
	northern reedgrass	<i>Calamagrostis stricta</i>
	prairie wedgegrass	<i>Sphenopolis obtusata</i>
	Canada wildrye	<i>Elymus canadensis</i>
Cool Season Exotic Grasses	smooth brome	<i>Bromus inermis</i>
	red top	<i>Agrostis stolonifera</i>
	Kentucky bluegrass	<i>Poa pratensis</i>
Sedges and Rushes	water sedge	<i>Carex aquatilis</i>
	broom sedge	<i>Carex scoparia</i>
	dark green bulrush	<i>Scirpus atrovirens</i>
	Torrey's rush	<i>Juncus torreyi</i>
	slender rush	<i>Juncus tenuis</i>
Conservative Prairie Forbs	rosinweed	<i>Silphium integrifolium</i>
	purple prairie clover	<i>Dalea purpurea</i>
	Canada milkvetch	<i>Astragalus canadensis</i>
	tall blazingstar	<i>Liatris pycnostachya</i>
Other Prairie Forbs	heath aster	<i>Aster ericoides</i>
	wild licorice	<i>Glycyrrhiza lepidota</i>
	black-eyed susan	<i>Rudbeckia hirta</i>
	pale-spike lobelia	<i>Lobelia spicata</i>
	prairie goldenrod	<i>Solidago missouriensis</i>
Wetland Forbs	boneset	<i>Eupatorium perfoliatum</i>
	sneezeweed	<i>Helenium autumnale</i>
	tufted loosestrife	<i>Lysmachia thrysifolia</i>
	winged loosestrife	<i>Lythrum alatum</i>
	water parsnip	<i>Sium suave</i>
Exotic Forbs	white sweet clover	( <i>Melilotus alba</i> )
	curly dock	( <i>Rumex crispus</i> )
	red clover	( <i>Trifolium pratense</i> )

**Table 2. Mean Percent Cover of Vegetation Categories. Similar letters indicate no significant difference ( $P > .05$ ) between treatments.**

Category	Native	High Divers.	Low Divers.	Riparian
Warm Season Grass	21.5a	33.9b	17.8a	16.0a
Cool Season Native	1.3a	8.3b	1.9a	1.9a
Cool Season Exotic	7.8a	2.0a	28.2b	8.3a
Sedges & Rushes	25.6a	4.9b	2.0b	21.1a
Conservative Forbs	1.0a	9.0b	2.0a	0.0a
Prairie Forbs	13.9a	18.7a	11.5a	11.3a
Wetland Forbs	5.6a	1.2b	0.6b	2.7ab
Exotic Forbs	3.1a	4.6a	12.5b	6.8a