

**Vegetation Classification
Of the Central Platte River
1998 Land Cover/Use Mapping Project**

Prepared for:

**Jan McKee
U.S. Fish & Wildlife Service
Platte River EIS Office**

By:

**Jack Butler
Remote Sensing & GIS Group
U.S Bureau of Reclamation**

May 22, 2001

**Vegetation Classification
Of the Central Platte River
1998 Land Cover/Use Mapping Project**

Prepared for:

**Jan McKee
U.S. Fish & Wildlife Service
Platte River EIS Office**

By:

**Jack Butler
Remote Sensing & GIS Group
U.S Bureau of Reclamation**

May 22, 2001

Table of Contents

Introduction	1
Preliminary Data Analysis	2
Riparian Forests, Woodlands and Shrublands	
<u>Classification</u>	3
<u>Ordination</u>	25
Lowland Grasslands and Wetlands	
<u>Classification</u>	26
<u>Ordination</u>	32
Literature Cited	43
Appendix A: Vegetation descriptions of NVCS Associations	45

List of Tables

Table 1. Foliar cover values recorded during the 1999 field season for selected major species, by layer and representative plots, in the <i>Cornus drummondii</i> – <i>Amorpha fruticosa</i> – <i>Cornus sericea</i> Shrubland association and the <i>Salix exigua</i> Temporarily Flooded Shrubland association found along the Central Platte River, Nebraska (T=foliar cover value < 1%).....	8
Table 2. Foliar cover values recorded during the 1999 field season for selected major species, by layer and representative plots, in the <i>Populus deltoides</i> Temporarily Flooded Woodland Alliance, <i>Fraxinus pennsylvanica</i> – <i>Ulmus</i> spp.- <i>Celtis occidentalis</i> Forest, <i>Populus deltoides</i> – (<i>Salix amygdaloides</i>) / <i>Salix exigua</i> Woodland (PODE/SAAM) found along the Central Platte River, Nebraska (T=foliar cover value < 1%).	13
Table 3. Foliar cover values recorded during the 1999 field season for selected major species, by layer and representative plots, in the <i>Populus deltoides</i> – <i>Fraxinus pennsylvanica</i> Forest found along the Central Platte River, Nebraska (T=foliar cover value < 1%).	19
Table 4. Foliar cover values for major indicator species recorded in individual and composite plots recorded during the 1999 field season for the <i>Andropogon gerardii</i> – <i>Calamagrostis canadensis</i> , <i>Panicum virgatum</i> Herbaceous Alliance, Introduced Grassland Herbaceous Alliance, and the <i>Typha</i> spp. – <i>Scirpus</i> spp. – Mixed Herbs Great Plains Herbaceous Vegetation.....	29

List of Figures

- Figure 1. Twinspan (McCune and Mefford 1999) dendrogram, with indicator species (S1=Tall Shrubs, S2=Short Shrubs, T2=Canopy) of 28 plots (composite plots and individual plots) collected from the Central Platte River, Nebraska during the 1999 field season. Classification of vegetation types was based on The National Vegetation Classification System (NatureServe 2000, available at <http://www.natureserve.org>). 5
- Figure 2. Detrended Correspondence Analysis (DECORANA: McCune and Mefford 1999) ordination of 33 vegetation plots representing the riparian and woodland plant communities along the Central Platte River, Nebraska that were evaluated during the 1999 field season. Please see Figure 1 for community names for each plot..... 6
- Figure 3. *Salix exigua* Temporarily Flooded Shrubland . These shrublands are usually found in close association with the *Populus deltoides* Temporarily Flooded Woodland Alliance (Plot 108 above, Plot 77 below)..... 10
- Figure 4. *Salix exigua* Temporarily Flooded Shrubland. Willow shrublands are early successional communities that are common on islands and riverbanks characterized by recently deposited alluvial sands..... 11
- Figure 5. *Populus deltoides* Temporarily Flooded Woodland Alliance. Both plot (Plot 102 above and Plot 103 below) are located on Jeffery Island. Both stands lack a shrub component in the understory. The cottonwood trees recorded in Plot 102 were relatively small in size compared to other woodland and forest plots observed during the project. Plot 103 is characterized by a few large cottonwood trees which appear to be replaced by elm species. 15
- Figure 6. *Fraxinus pennsylvanica* – *Ulmus* spp. – *Celtis occidentalis* Forest. A fairly dense canopy of green ash characterizes Plot # 76 (above) with boxelder serving as major secondary species. In Plot #79 (left) green ash trees are scattered with a canopy cover of 25-50%, and a fairly dense understory dominated by rough-leaved dogwood. 16
- Figure 7. *Populus deltoides* – (*Salix amygdaloides*) / *Salix exigua* Woodland (Plot # 99)..... 18
- Figure 8. *Populus deltoides* – *Fraxinus pennsylvanica* Forest. Plot 11 (left) illustrates an older stand of cottonwoods located relatively far from the main channel of the river. The subcanopy is dominated by Eastern red cedar with green ash seedlings occurring as small component of the herbaceous layer. This plot is characterized by a distinct lack of tall or short shrubs. Switchgrass and Kentucky bluegrass were the dominant understory species. *Populus deltoides* – *Fraxinus pennsylvanica* Forest. Plot 19 (right) illustrates a closed-canopy riparian forest located relatively close to the river where cottonwoods and green ash trees were fairly equally abundant. This plot, along with plot 11 above, was unique in that there was a complete absence of rough-leaved dogwoods in the shrub layers. Plot 19 was also unique in that chokecherry formed a major component of the understory vegetation..... 20

Figure 9. *Populus deltoides* – *Fraxinus pennsylvanica* Forest. These two plots illustrate the possible successional sequence for these riparian forests. Plot 33 (above) is an example of a relatively closed canopy forest with a well developed overstory of cottonwood and green ash. Green ash was a common component of the subcanopy, short shrub, and herbaceous layers. In plot 75 (left), density and canopy cover of cottonwoods is lower and several snags and logs were observed. Green ash was a common constituent of the subcanopy and tall shrub layer, while rough-leaved dogwood produced a relatively thick understory. 22

Figure 10. *Populus deltoides* – *Fraxinus pennsylvanica* Forest. In older stands, green ash becomes more prominent in the community as in Plot 80 (left). Reed canarygrass is the most dominant herbaceous species in this plot. Eastern red cedar is also a common constituent of these forests sometimes forming an almost impenetrable layer as illustrated in Plot 82 (below).23

Figure 11. *Populus deltoides* – *Fraxinus pennsylvanica* Forest. Canopy cover for these riparian ranges from about 40% (Plot 98 left) to 100% (Plot 90 above). Composition of the herbaceous layer is variable and understory shrubs are often sparse..... 24

Figure 12. Twinspan (McCune and Mefford 1999) dendrogram, with indicator species (AGRO=*Agropyron* spp., AMPS=*Ambrosia psilostachya*, AMTR=*A. trifida*, ANGE=*Andropogon gerardii*, ASSY=*Asclepias syriaca*, BRIN=*Bromus inermis*, CAIN=*Calamagrostis inexpansa*, CAREX=*Carex* sp., ELCA=*Elymus canadensis*, EQAR=*Equisetum arvense*, HOJU=*Hordeum jubatum*, PAVI=*Panicum virgatum*, POPR=*Poa pratensis*, RUCR=*Rumex crispus*, SCAM=*Scirpus americanus*, SOGI=*Solidago gigantean*, SPCR=*Sporobolus cryptandrus*, and SPPE=*Spartina pectinata*) collected from the Central Platte River, Nebraska during the 1999 field season. Classification of vegetation types was based on The National Vegetation Classification System (NatureServe 2000, available at <http://www.natureserve.org>). 27

Figure 13. Detrended Correspondence Analysis (DECORANA: McCune and Mefford 1999) ordination of 53 vegetation plots representing the grassland and wet meadow plant communities along the Central Platte River, Nebraska that were evaluated during the 1999 field season. Please see Figure 12 for community names for each plot..... 36

Figure 14. The photographs above (Plot 112 above left, Plot 22 above right) provide grazed examples of the *Andropogon gerardii* (*Calamagrostis Canadensis*, *Panicum virgatum* Herbaceous Alliance. In both cases, it appears that switchgrass and prairie cordgrass were not grazed as heavily as big bluestem. Plot 6 (left) provides a comparable example of a somewhat more lightly grazed plot. 34

Figure 15. Plot 116 (above) illustrates a grazed *Andropogon gerardii* (*Calamagrostis Canadensis*, *Panicum virgatum* Herbaceous Alliance that contains a substantial amount of Kentucky bluegrass and prairie cordgrass. The visibility of prairie cordgrass in Plot 109 (below) appears to have been enhanced somewhat by grazing..... 35

Figure 16. Plot 3 (above left) is an example of the *Typha* spp. – *Scirpus* spp. Mixed Herbs Great Plains Herbaceous Alliance that contains a mixture of 3-square bulrush, prairie cordgrass, big bluestem, and switchgrass. Plot 104 (above right) is a relatively dry *Andropogon gerardii* (*Calamagrostis Canadensis*, *Panicum virgatum* Herbaceous Alliance grassland sampled on Jeffery island, while Plot 10 (left) is a more mesic example of this alliance with a fairly even mix of big bluestem, switchgrass, and Kentucky bluegrass..... 36

Figure 17. Plot 13 (above left) illustrates an *Andropogon gerardii* (*Calamagrostis Canadensis*, *Panicum virgatum* Herbaceous Alliance that contains an almost pure stand of big bluestem. The vegetation distribution of Plot 7 (above right) is strongly influenced by very slight swales. Plot 2 (left) is an example of an Introduced Grassland with exceptionally high species diversity, especially graminoids..... 37

Figure 18. Plots 15 (above left) and Plot 16 (above right) are examples of the *Andropogon gerardii* (*Calamagrostis Canadensis*, *Panicum virgatum* Herbaceous Alliance that appear to have been burned sometime in the recent past. Plot 17 (left) is a *Andropogon gerardii* (*Calamagrostis Canadensis*, *Panicum virgatum* Herbaceous Alliance that contains a substantial amount of smooth brome and Kentucky Bluegrass..... 38

Figure 19. *Andropogon gerardii* – (*Calamagrostis canadensis*, *Panicum virgatum*) Herbaceous Alliance. Plot 18 (top left) occurs in a slight channel where the density and cover of big bluestem is slightly less than the surrounding upland sites. There was very little standing dead and litter in the plot suggesting that the area had either been previously burned or hayed. Plot 48 (above) is dominated almost exclusively by big bluestem. Plot 88 (left) illustrates a typical Introduced Grassland – *Bromus inermis* Herbaceous Alliance in which the abundance of smooth brome masks the contribution by big bluestem and switchgrass 39

Figure 20. Introduced Grassland – *Poa pratensis* Herbaceous Alliance. (Plot 32 left above, plot 86 above, and plot 105 left). Plot 86 above forms an ecotone between a grazed big bluestem pasture and cottonwood forest. A few scattered green ash and Russian olive trees occur in the area. Plot 105 (left) is located on Jeffery Island and contains a substantial amount of woolly mullen. In addition, the plot also contained a substantial amount of musk thistle rosettes. 40

Figure 21. These photographs illustrate the basic physiognomic characteristics of the Introduced Grasslands observed in the project area. Plots 34 and 87 contain a fairly substantial amount of big bluestem. 41

Figure 22. Sand Flats Temporarily Flooded Sparse Vegetation Alliance (Plot 110)..... 42

Introduction

The Platte River floodplain of central Nebraska is characterized by a variety of vegetation types that reflect the complex land management history and hydrology of the region. Currier (1982) provided rather detailed descriptions and classifications of the major riparian plant communities that contained a discussion of the phytosociological relationships within and among the vegetation types. In 2000, Friesen et al. completed a land cover/use mapping project that included much of the study area used by Currier in his study. Using 1998 color-infrared aerial photographs and detailed field reconnaissance, Friesen et al. (2000) identified 12 natural vegetation and seven agricultural land-cover types, five surface hydrology types, and 14 land-use classifications.

Field collection of the data used to develop the vegetation and agricultural classifications described by Friesen et al (2000) followed the procedures described by the National Vegetation Classification System (NVCS) (Grossman et al. 1998). Intensive plot samples were collected from 118 plots that were either randomly or subjectively selected by the field investigator, depending on access. All species occurring with a plot were recorded and assigned to one of six foliar cover classes. These data were then used to develop a preliminary classification of the vegetation of the project area following guidelines established by the NVCS, which is reported by Friesen et al. (2000). The purpose of this paper is to quantitatively analyze the original plot data and further refine the preliminary vegetation classification of the project area. Ordination analyses were conducted on the dataset with the objective of providing additional insight into possible spatial patterns in the vegetation that may be related to environmental and successional gradients. Further, every effort was made to cross-walk the vegetation types prescribed by the NVCS into the vegetation classifications and descriptions provided by Currier (1982).

Preliminary Data Analysis

Data from the 118 vegetation plots collected along the Central Platte River were entered into the "Plots" database following procedures outlined by the National Vegetation Classification System (Grossman et al. 1998). Species foliar cover values for each plot were then exported into a spreadsheet format and initially arranged into a plot (rows = 118) by species (columns = 92) data matrix. Several of the 92 species recorded in the Plots database, primarily riparian trees and shrubs, occupied more than one stratum within a particular plot. Such layers provide valuable information regarding the structural diversity of the association and potential successional trends. To incorporate this information into the matrix, the code names for species occurring in more than one layer were subscripted with the strata code (T1, T2, S1, S2, S3, for example). The matrix was then used in exploratory analyses with the objectives of summarizing the compositional and structural characteristics of the communities and assessing possible spatial patterns related to environmental gradients.

Following procedures described by Grossman et al. (1988) and McCune and Mefford (1999), the data matrix was analyzed several times using TWINSpan, Cluster Analysis (classification techniques), and DECORANA (an ordination technique). The matrix was edited prior to analysis by first removing all species that had total cover values (summed over all 118 plots) of $\leq 1\%$. Further, all TWINSpan grouping analyses were conducted using relativized foliar cover values, while raw foliar cover scores were used in the Cluster Analysis and DECORANA ordination procedures. The data matrix was then subjectively evaluated for plots that demonstrated exceptionally low similarity to the remaining plots (Outliers). Outlier plots are common in relatively large data sets such as the one used here and occur because of disturbed, heterogeneous, or otherwise unusual sites, or because of gaps in sampling (Gauch

1982). Removing outliers increases the efficiency of the analysis and substantially improves the interpretability of the results. The exploratory analysis did not reveal any substantial outliers.

Plots were then subjectively grouped into one of two broad categories based on the initial classification provided by Friesen et al. (2000). In that study, classification was based on location of the communities relative to the floodplain of the Platte River. Following those basic guidelines, the first category used in this project included riparian woodlands (Woody within Floodplain community types) and riparian shrublands (Shrubs within Floodplain community types), while the second category included the Lowland Grasslands and Wetlands community types (Friesen et al. 2000). The somewhat artificial classification used here is congruent with the classification scheme described by Currier (1982) for the vegetation of the Platte River Flood Plain. The overall goal of these initial classifications was to reduce the size of the data matrix along natural physiognomic boundaries prior to classification and ordination (McCune and Mefford 1999).

Riparian Forests, Woodlands and Shrublands

Classification

Preliminary classification of the riparian woodland and shrubland plots using Cluster Analysis (relative Euclidean distance and the Ward's group linkage method) and TWINSpan (McCune and Mefford 1999) identified several groups of plots that exhibited considerable similarity. These plots were combined into composite plots that served as representative plots for several community types. The remaining plots and composite plots were subjected to the final classification using TWINSpan (Figure 1). The final classification matrix was then

analyzed using DECORANA (McCune and Mefford 1999), which identified two outlier plots (plots 35 and 103). These two plots were removed prior to the final ordination (Figure 2). Removing these outliers had the effect of spreading out the remaining plots in a two-dimensional space that may represent important environmental gradients.

The results of the classification process produced several large and predictable groups that included two shrubland associations dominated by *Salix exigua* or *Cornus drummondii*, two forest associations, one woodland association, and one woodland alliance characterized by various combinations of *Fraxinus pennsylvanica*, *Populus deltoides*, *Salix exigua*, and *Ulmus* species (Figure 1). The final classification followed guidelines described the National Vegetation Classification System (Grossman et al. 1998). Specific classification information and descriptions of these vegetation types as provided by the Association of Biodiversity Information (www.natureserve.org) are included in Appendix A.

In Figure 1, species that occupy the same stratum are separated by a hyphen (-), while those occurring in different strata are separated by a slash (/) (Grossman et al. 1998). Species that are enclosed in parentheses are those that occur infrequently in the association. Forests are defined as vegetation types dominated by tree species with overlapping canopies of 60-100% cover (Grossman et al. 1998). Woodlands are considered more open stands of trees that exhibit non-overlapping canopies with 25-60% cover. The association is the finest level of the National Vegetation Classification System hierarchy. At this level, the plant community exhibits a definitive species composition and uniform physiognomy (Grossman et al. 1998). Alliances are one level up from the association level and are characterized by one or more diagnostic species.

Figure 1 illustrates both the consistency and the variability of the forests, woodlands, and shrublands found along the Platte River. These patterns reflect the complex integration of the

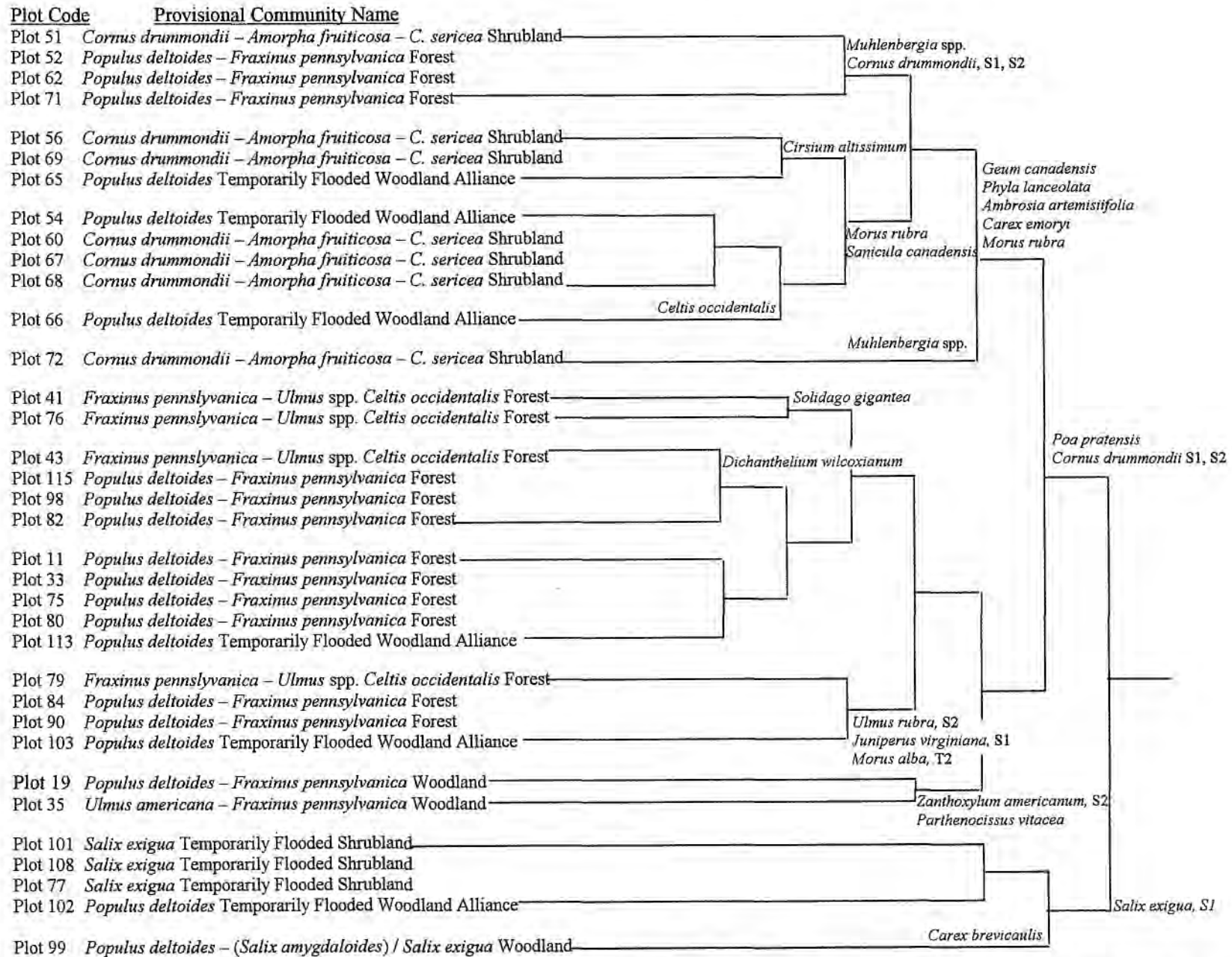


Figure 1. Twinspan (McCune and Mefford 1999) dendrogram, with indicator species (S1=Tall Shrubs, S2=Short Shrubs, T2=Canopy) of 28 plots (composite plots and individual plots) collected from the Central Platte River, Nebraska during the 1999 field season. Classification of vegetation types was based on The National Vegetation Classification System (NatureServe 2000, available at <http://www.natureserve.org>).

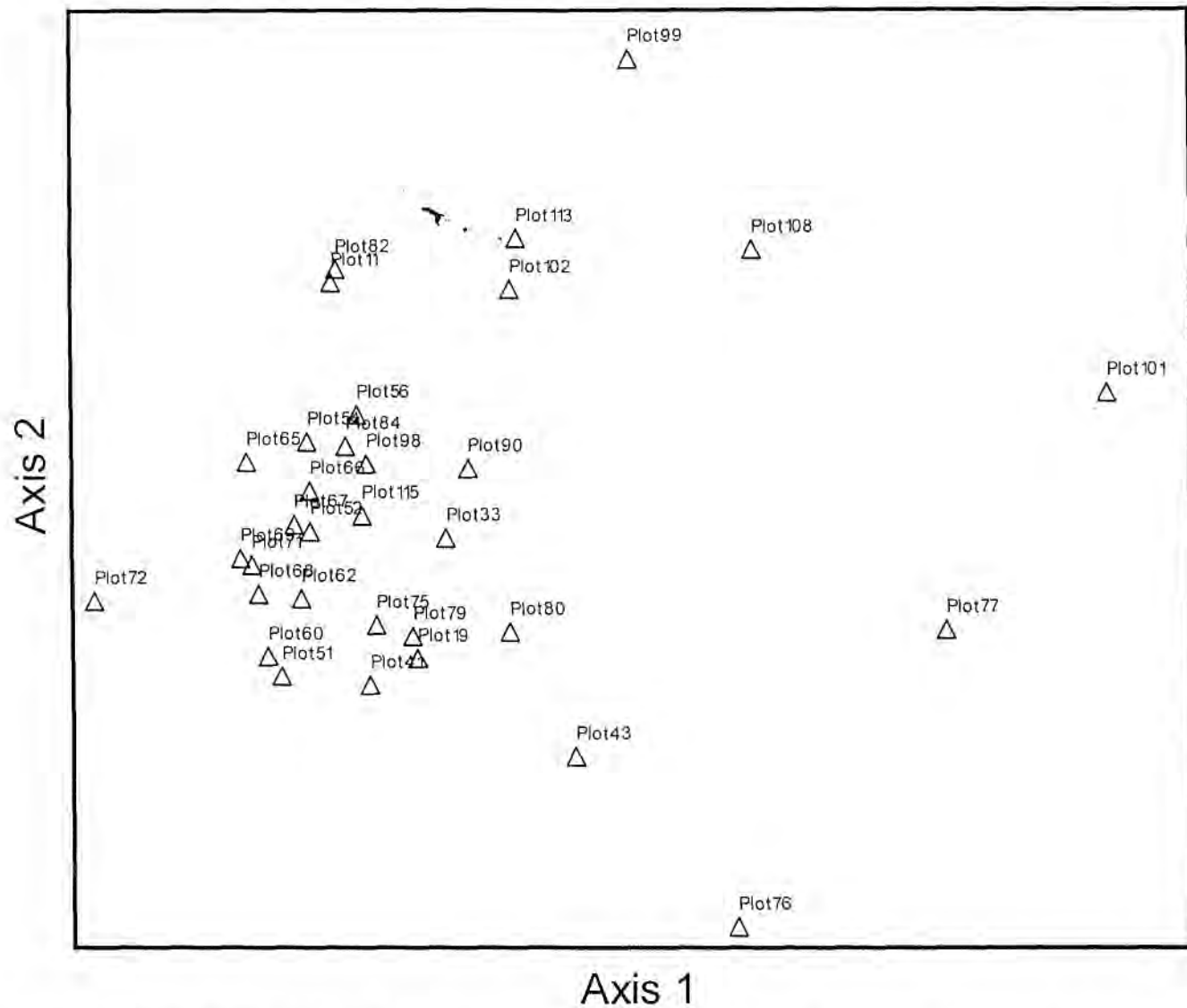


Figure 2. Detrended Correspondence Analysis (DECORANA: McCune and Mefford 1999) ordination of 33 vegetation plots representing the riparian and woodland plant communities along the Central Platte River, Nebraska that were evaluated during the 1999 field season. Please see Figure 1 for community names for each plot.

historic distribution of woodland habitat related to ecological succession under a variety of different land management strategies with the environmental gradients that occur within the floodplain corridor (i.e. distance from the River and potential patterns related to the east-west environmental gradient) (Figure 2).

Shrublands are fairly common on islands in the Platte River or along shorelines immediately adjacent to the River and are dominated by either *Salix exigua* or *Cornus drummondii* (Table 1). *Salix exigua* Temporarily Flooded Shrublands often occupy entire islands or form fringes along the riverbanks. *Salix exigua* is one of the first species to colonize newly exposed or recently deposited sandy sites often forming fairly dense stands with little to no understory (Figures 3 and 4, and Currier 1982). Seedlings of *Populus deltoides* are often frequent understory constituents. Although *Amorpha fruticosa* is usually not a common component of the willow shrublands investigated in this study, Currier (1982) reported that this species was often a major secondary species associated with the *S. exigua* shrubland. *Cornus drummondii* – *Amorpha fruticosa* – *C. sericea* Shrublands occur adjacent to or intermixed with the woodland and forest associations along the River (photograph not available). Representative stands of this association are usually below the minimum mapping unit of 0.5 ha (Friesen et al. 2000). Typically, these shrublands are characterized by a high density of tall and short shrubs dominated by *C. drummondii* (Table 1). *Fraxinus pennsylvanica*, *Populus deltoides*, or *Morus rubra* trees are often a small, but conspicuous, component of the canopy or subcanopy layer. *Poa pratensis* was the most common understory species recorded in this study, which is similar to the results reported by Currier (1982). Currier also indicated that *Amorpha fruticosa* was a frequent associate of this vegetation type; however, this species was not a major component of the shrublands sampled in this study. Furthermore, Currier described two distinct

Table 1. Continued.

	<i>Cornus drummondii</i> – <i>Amorpha fruticosa</i> – – <i>Cornus sericea</i> Shrubland							<i>Salix exigua</i> Temporarily Flooded Shrubland		
Species	Plot # 51	Plot # 72	Plot # 60	Plot # 67	Plot # 68	Plot # 69	Plot # 56	Plot #101	Plot #108	Plot # 77
Herbaceous Layer										
<i>Arundo donax</i>								63		
<i>Geum Canadensis</i>	T	38	T	T	T					
<i>Poa pratensis</i>	15	3	38	3	15	50	26			
<i>Spartina pectinata</i>		T			T		38		17	



Figure 3. *Salix exigua* Temporarily Flooded Shrubland . These shrublands are usually found in close association with the *Populus deltoides* Temporarily Flooded Woodland Alliance (Plot 108 above, Plot 77 below).





Figure 4. *Salix exigua* Temporarily Flooded Shrubland. Willow shrublands are early successional communities that are common on islands and riverbanks characterized by recently deposited alluvial sands.



shrub types dominated by *Amorpha fruticosa* (*Amorpha/Salix* and *Amorpha/Cornus*). These types were not recognized during the 1999 survey primarily because, when stands of *A. fruticosa* did occur, they were usually well below the minimum mapping unit of 0.5 ha established for the study.

Woodlands and forests along the Platte River are universally described as relatively recent vegetation formations (Currier 1982, Friesen et al. 2000). *Populus deltoides* is the most common tree species found along the floodplain of the Platte River (Friesen et al. 2000) and was the dominant species in one forest type and two woodland types (Figure 1). The *Populus deltoides* Temporarily Flooded Woodland Alliance is characterized by an open canopy with a herbaceous understory with few shrubs (Table 2, Figure 5). Representative plots were established on Jeffery Island (Plots 102, 103, and 113) and the Cottonwood Ranch (Plots 54, 65, and 66). Composition of this alliance as evaluated in 1999 is consistent with the description of the “Populus Open Meadow” and “Populus Shrub Meadow” vegetation types classified by Currier (1982). In his study, Currier described these meadow types as usually occurring on grazed, upland forest sites, which included Jeffery Island.

The *Fraxinus pennsylvanica* – *Ulmus* spp. – *Celtis occidentalis* Forest appears to represent the relatively mature riparian stands in which *Populus deltoides* assumes a more modest secondary role (Table 2). *Fraxinus pennsylvanica* was the dominant overstory species with *Cornus drummondii* as the most common shrub species (Figure 7). Composition of the herbaceous component varied considerably from one stand to the next. This forest vegetation type is similar to the “Mixed Hardwood Shrub” vegetation type described by Currier (1982). Currier also indicated that the mixed hardwood types he found were usually more frequent on the

Table 2. Foliar cover values recorded during the 1999 field season for selected major species, by layer and representative plots, in the *Populus deltoides* Temporarily Flooded Woodland Alliance, *Fraxinus pennsylvanica* – *Ulmus* spp. – *Celtis occidentalis* Forest, *Populus deltoides* – (*Salix amygdaloides*) / *Salix exigua* Woodland (PODE/SAAM) found along the Central Platte River, Nebraska (T=foliar cover value < 1%).

	<i>Populus deltoides</i> Temporarily Flooded Woodland Alliance						<i>Fraxinus pennsylvanica</i> – <i>Ulmus</i> spp. – <i>Celtis occidentalis</i> Forest				PODE/ SAAM
Species	Plot # 54	Plot # 65	Plot # 66	Plot # 102	Plot # 103	Plot # 113	Plot # 41	Plot # 43	Plot # 76	Plot # 79	Plot # 99
Canopy Layer											
<i>Populus deltoides</i>	38	38	38	63	T	63	3	15		15	38
Subcanopy Layer											
<i>Acer negundo</i>									38		
<i>Fraxinus pennsylvanica</i>							38	38	63	38	
<i>Juniperus virginiana</i>					3						
<i>Salix amygdaloides</i>											38
<i>Ulmus rubra</i>					15			15		3	
Tall Shrub Layer											
<i>Amorpha fruticosa</i>							3				63
<i>Cornus drummondii</i>	38	8	38			3	38	63	15	63	
<i>Juniperus virginiana</i>	9	3						3		3	
Short Shrub Layer											
<i>Cornus drummondii</i>	15	3			15			15			

Table 2. continued.

	<i>Populus deltoides</i> Temporarily Flooded Woodland Alliance						<i>Fraxinus pennsylvanica</i> – <i>Ulmus</i> spp. - <i>Celtis occidentalis</i> Forest				PODE/ SAAM
Species	Plot # 54	Plot # 65	Plot # 66	Plot # 102	Plot # 103	Plot # 113	Plot # 41	Plot # 43	Plot # 76	Plot # 79	Plot # 99
Herbaceous Layer											
<i>Bromus japonicus</i>				T	15	T					3
<i>B. inermis</i>	15										
<i>Carex emoryi</i>		9									
<i>Carex</i> spp.											15
<i>Muhlenbergia</i> spp.							15				
<i>Panicum virgatum</i>	15					15	15				
<i>Phalaris arundinacea</i>								63	63	3	
<i>Poa pratensis</i>	15	50	15				3	15		38	
<i>Solidago gigantea</i>							15	T	15		
<i>Spartina pectinata</i>	15					38				15	
<i>Sporobolus cryptandrus</i>					15	T					
<i>Tyoxicondendron rydbergii</i>					15					38	



Figure 5. *Populus deltoides* Temporarily Flooded Woodland Alliance. Both plot (Plot 102 above and Plot 103 below) are located on Jeffery Island. Both stands lack a shrub component in the understory. The cottonwood trees recorded in Plot 102 were relatively small in size compared to other woodland and forest plots observed during the project. Plot 103 is characterized by a few large cottonwood trees which appear to be replaced by elm species.





Figure 6. *Fraxinus pennsylvanica* – *Ulmus* spp. – *Celtis occidentalis* Forest. A fairly dense canopy of green ash characterizes Plot # 76 (above) with boxelder serving as major secondary species. In Plot #79 (left) green ash trees are scattered with a canopy cover of 25-50%, and a fairly dense understory dominated by rough-leaved dogwood.

eastern portion of the Platte River, specifically east of Overton. All four of the plots evaluated in this study are located within Bridge Segment #7, which is east of Kearney.

Only a couple of examples of the *Populus deltoides* – (*Salix amygdaloides*) / *Salix exigua* Woodland were found during the 1999 field survey (Table 2, Figure 7). This stand is located in an intermittently flooded portion of the main river channel. Canopy cover of *Populus deltoides* was relatively high with a well developed shrub understory dominated by *Salix exigua* and *Amorpha fruticosa*. Currier (1982) described a similar vegetation type that he classified as a “*Populus/Salix* Wetland” community that occurred on several sites in that study. The difference in the frequency of occurrence of this vegetation type between what was reported by Currier (1982) and what was reported by the 1999 survey may be a reflection of the changes in these communities as a result of ecological succession during the 17 year time period between the two studies.

The *Populus deltoides* - *Fraxinus pennsylvanica* Forest was one of the most common associations recorded during the 1999 field survey (Table 3). The sampled stands tended to be very diverse both compositionally and structurally (Figures 8-11). *Fraxinus pennsylvanica* and *Juniperus virginiana* were the most common components of the subcanopy associated with an overstory of *Populus deltoides*. The stands were also characterized by fairly dense stands of shrubs that were usually dominated by *Cornus drummondii*. This association appears to be similar to the *Juniperus/Populus*, *Populus/Juniperus*, and Mixed Hardwood Shrub vegetation types described by Currier (1982). Again, the differences between those types described by Currier in 1982 and those classified here is undoubtedly related to successional patterns that accrued over the last 17 years.



Figure 7. *Populus deltoides* – (*Salix amygdaloides*) / *Salix exigua* Woodland (Plot # 99).

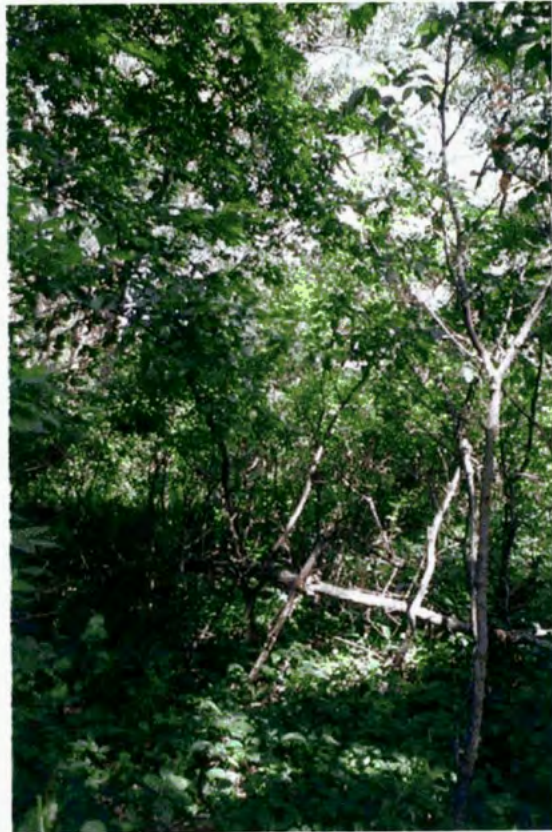
Table 3. continued.

Species	Plot # 11	Plot # 19	Plot # 33	Plot # 35	Plot # 52	Plot # 62	Plot # 71	Plot # 75	Plot # 80	Plot # 82	Plot # 84	Plot # 90	Plot # 98
Short Shrub Layer													
<i>Cornus drummondii</i>	T		9		15	38	38	38	15	15	15		16
<i>Fraxinus pennsylvanica</i>	3		8	T		T			T				
<i>Prunus virginiana</i>		38											
Herbaceous Layer													
<i>Bromus japonicus</i>							T				3	T	3
<i>B. inermis</i>				38						3			15
<i>Carex emoryi</i>					3	T	18						
<i>Dactylis glomerata</i>				63									
<i>Elymus canadensis</i>											3	38	
<i>Panicum virgatum</i>	15			T							15		15
<i>Parthenocissus vitacea</i>		38											
<i>Phalaris arundinaceae</i>									26				
<i>Poa pratensis</i>	15	38				15	38	15	1	3	15	15	15
<i>Spartina pectinata</i>			19	3									
<i>Toxicodendron rydbergii</i>	3	63	8						9	T			T



Figure 8.

Populus deltoides – *Fraxinus pennsylvanica* Forest. Plot 11 (left) illustrates an older stand of cottonwoods located relatively far from the main channel of the river. The subcanopy is dominated by Eastern red cedar with green ash seedlings occurring as small component of the herbaceous layer. This plot is characterized by a distinct lack of tall or short shrubs. Switchgrass and Kentucky bluegrass were the dominant understory species.



Populus deltoides – *Fraxinus pennsylvanica* Forest. Plot 19 (right) illustrates a closed-canopy riparian forest located relatively close to the river where cottonwoods and green ash trees were fairly equally abundant. This plot, along with plot 11 above, was unique in that there was a complete absence of rough-leaved dogwoods in the shrub layers. Plot 19 was also unique in that chokecherry formed a major component of the understory vegetation.



Figure 9.

Populus deltoides – *Fraxinus pennsylvanica* Forest. These two plots illustrate the possible successional sequence for these riparian forests. Plot 33 (above) is an example of a relatively closed canopy forest with a well developed overstory of cottonwood and green ash. Green ash was a common component of the subcanopy, short shrub, and herbaceous layers. In plot 75 (left), density and canopy cover of cottonwoods is lower and several snags and logs were observed. Green ash was a common constituent of the subcanopy and tall shrub layer, while rough-leaved dogwood produced a relatively thick understory.



Figure 10.

Populus deltoides – *Fraxinus pennsylvanica* Forest. In older stands, green ash becomes more prominent in the community as in Plot 80 (left). Reed canarygrass is the most dominant herbaceous species in this plot. Eastern red cedar is also a common constituent of these forests sometimes forming an almost impenetrable layer as illustrated in Plot 82 (below).





Figure 11.

Populus deltoides – *Fraxinus pennsylvanica*
Forest. Canopy cover for these riparian ranges
from about 40% (Plot 98 left) to 100% (Plot 90
above). Composition of the herbaceous layer is
variable and understory shrubs are often sparse.

Ordination

Ordination of the plots emphasized the patterns illustrated by the classification and placed the plots along a two-dimensional environmental gradient. The gradient appears to reflect soil and moisture conditions that often occur within and along the floodplain (i.e. distance from the River and potential patterns related to an east-west environmental gradient), which, in turn, interact with the patterns and processes of ecological succession associated with a variety of different land management strategies to produce a relatively complex vegetation mosaic (Figure 2). The first axis of the DCA analysis explained about 40% of the variation in the ordination and appears to be related to a moisture/succession gradient. Shrubland communities located immediately adjacent to the Platte River dominated by *Salix exigua* are ordinated at one end of the environmental gradient. *Salix exigua* is usually one of the first species to colonize newly exposed or recently deposited sandy sites. In contrast, the *Cornus drummondii* association typically occurs adjacent to the relatively drier upland sites that occupy the first and second terraces immediately adjacent to the river.

The second axis contributed an additional 22% to the ordination and may represent a complex combination of additional successional relationships, different land management objectives, and an east-west environmental gradient. The upper end of Axis 2 is dominated by *Populus deltoides*. Many of these plots (plot #s 99, 102, 108, 113) are located on Jeffery Island toward the western edge of the project area. In contrast, the lower end of Axis 2 contain plots characterized by a fairly dense canopy of *Fraxinus pennsylvanica*, which are located on the Cottonwood Ranch. The middle of the two-axis gradient contains an intricate mixture of riparian woodland and shrubland associations. This grouping of plots occupy sites on Jeffery Island, Cottonwood Ranch, and sites near Kearny.

Ecological succession of floodplain vegetation is typically described as a sequence that begins with colonization of mudflats and sandbars by pioneer grasses and forbs (Currier 1982). These species are usually replaced by shrublands characterized by a fairly thick stand of *Salix exigua* and a relatively small component of *Populus deltoides* seedlings. *Cornus drummondii* may be the alternative shrubland on the somewhat drier sites of the floodplain. The next stage is dominated by a fairly well-developed canopy of *Populus deltoides* with an understory of *Salix exigua*, *Cornus drummondii*, *Fraxinus pennsylvanica*, *Juniperus virginiana*, *Morus* sp., and *Ulmus* sp. The composition of the understory of a particular site appears to be strongly related to land management practices. Grazing by domestic livestock, and possibly fire, appears to favor the development of the *Populus deltoides* Temporarily Flooded Woodland Alliance. However, most of the plots that illustrate the later stage of succession usually contain a complex mixture of understory species. The end point typically described for this sequence is represented by communities dominated by *Fraxinus*, *Celtis*, *Ulmus*, and *Morus*. Currier (1982) pointed out that, at the time of his study, these more advanced stages of forest development along the Platte River did not exist. However, several examples of the *Fraxinus pennsylvanica* – *Ulmus* spp. – *Celtis occidentalis* Forest were observed during the process of completing the 1999 field survey.

Lowland Grasslands and Wetlands

Classification

Although the herbaceous communities within the project area all occupy similar sites on the landscape, current species composition and abundance is strongly influenced by an extremely wide variety of past and current management practices in addition to the same environmental gradients previously discussed. While the plots exhibited considerable consistency with regard

to the composition of the major species (*Andropogon gerardii*, *Panicum virgatum*, *Poa pratensis*, and *Spartina pectinata*, for example), foliar cover values for these species as well as composition of the less dominant species varied considerably among the sampled plots. This variability made the final vegetation classification somewhat more challenging compared to the riparian woodland shrubland communities, which are probably less influenced by management practices such as grazing by domestic livestock.

The plots artificially classified as Lowland Grasslands and Wetlands were initially analyzed using Cluster Analysis (relative Euclidean distance and the Ward's group linkage method) (McCune and Mefford 1999). In contrast to the woodland and shrubland plots, only a few of the lowland and grassland and wetland plots were sufficiently similar to warrant being combined into composite plots. These results further illustrates the considerable variation among the plots in species composition and abundance. Additional analysis using TWINSpan (McCune and Mefford 1999) appeared to classify the plots into one of four NVCS vegetation types that included three alliance level classes and one association (Figure 12). In most cases, it was difficult to confidently classify individual plots at the association level.

The two most likely Associations for the plots classified within the *Andropogon gerardii* – (*Calamagrostis canadensis*, *Panicum virgatum*) Herbaceous Alliance include the *Andropogon gerardii* – *Panicum virgatum* – *Helianthus grosseserratus* Herbaceous Vegetation and the *Andropogon gerardii* – *Panicum virgatum* Sandhills Herbaceous Vegetation (please see Appendix A). *Andropogon gerardii* and *Poa pratensis* were the two most consistently recorded species of the plots placed in this alliance, while major secondary species included *Panicum virgatum* and *Spartina pectinata* (Table 4). The prominence of *Panicum virgatum* and, more importantly, *Spartina pectinata* in the alliance appears to be strongly influenced by livestock

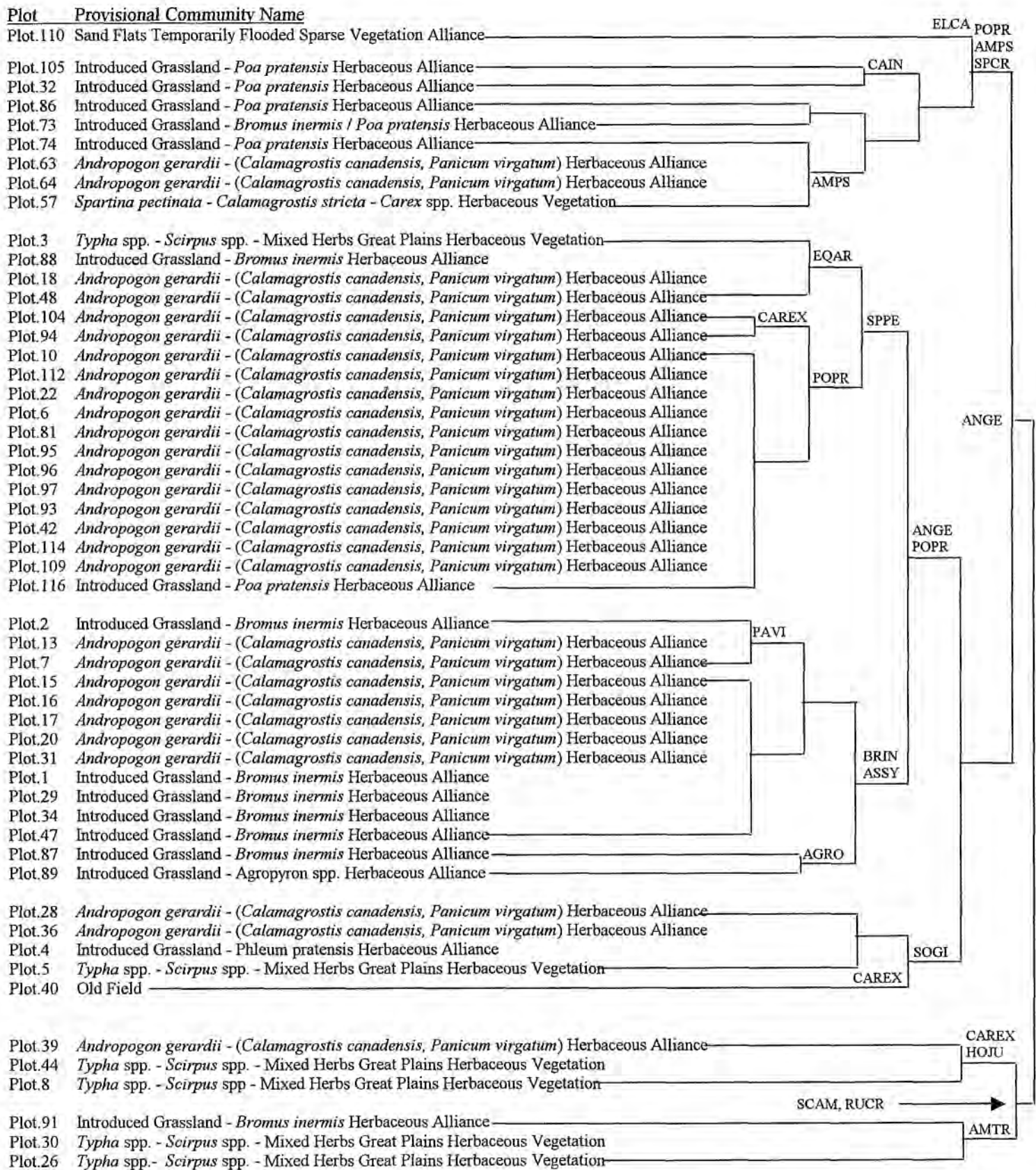


Figure 12. Twinspan (McCune and Mefford 1999) dendrogram, with indicator species (AGRO=*Agropyron* spp., AMPS=*Ambrosia psilostachya*, AMTR=*A. trifida*, ANGE=*Andropogon gerardii*, ASSY=*Asclepias syriaca*, BRIN=*Bromus inermis*, CAIN=*Calamagrostis inexpansa*, CAREX=*Carex* sp., ELCA=*Elymus canadensis*, EQAR=*Equisetum arvense*, HOJU=*Hordeum jubatum*, PAVI=*Panicum virgatum*, POPR=*Poa pratensis*, RUCR=*Rumex crispus*, SCAM=*Scirpus americanus*, SOGI=*Solidago gigantea*, SPCR=*Sporobolus cryptandrus*, and SPPE=*Spartina pectinata*) collected from the Central Platte River, Nebraska during the 1999 field season. Classification of vegetation types was based on The National Vegetation Classification System (NatureServe 2000, available at <http://www.natureserve.org>).

Table 4. Foliar cover values for major indicator species recorded in individual and composite plots recorded during the 1999 field season for the *Andropogon gerardii* - *Calamagrostis canadensis*, *Panicum virgatum*) Herbaceous Alliance, Introduced Grassland Herbaceous Alliance , and the *Typha* spp. - *Scirpus* spp. - Mixed Herbs Great Plains Herbaceous Vegetation.

Plot	Species																			
	AMPS	AMTR	ANGE	ASSY	BRIN	CAIN	CAREX	ELCA	EQAR	HOJU	PASM	PAVI	PHAR	POPR	RUCR	SCAM2	SOGI	SPCR	SPPE	TYPH
110	2.5						0.5	2.5		0.5			0.5	2.5	0.5			0.5	15.0	2.5
105	2.5					15.0								87.5						
32	0.5			0.5		0.5								87.5			2.5			
74	15.0											15.0		87.5						
63	26.3		7.5											62.5				0.3		
64	2.5		2.5											87.5						
86	15.0					2.5								37.5				15.0		
73	2.5				37.5	15.0			0.5			0.5		37.5						
57	2.5						0.5		0.5					15.0				0.5	0.5	
18			15.0				2.5		15										15.0	
48			87.5				2.5		2.5					2.5			0.5			
88			15.0		62.5			0.5	2.5			15.0		2.5					37.5	
3			15.0						0.5		0.5	15.0		0.5		37.5	2.5		15.0	
104	0.5		37.5			0.3	7.5			0.3		15.0		15.0				1.3		
94			37.5			2.5	15.0					15.0		15.0						
10			37.5								2.5	37.5		37.5			15.0			
112			37.5									37.5		15.0					62.5	
22	1.3		37.5			2.5			0.5			15.0		15.0						
6			37.5		15.0				0.5		0.5	37.5		15.0					15.0	
81			62.5									37.5		2.5						
95			62.5	0.3		1.3		1.3		1.3	0.3			15					1.3	
96			37.5			7.5					15.0	9		9						
97			37.5			2.5	0.5			0.5		37.5		15.0					15.0	
93			37.5			0.5		2.5				15.0		15.0					62.5	
42			15.0			0.5						0.5		37.5			2.5			
116			37.5									15.0		37.5					87.5	
114			37.5			0.3				0.3		37.5		15.0					2.5	
109			37.5							0.5		37.5		15.0					2.5	
13			62.5	2.5	2.5							15.0		2.5			2.5			
7			37.5	0.5								15.0		15.0						
2					37.5				0.5	0.5	2.5	15.0	2.5	15.0						
15			37.5	0.5	37.5	0.5	0.5		0.5	0.5		2.5		15.0						
16			15.0		37.5		2.5		2.5					15.0						
17	15.0		15.0	0.5	37.5	0.5			0.5			2.5		37.5						
20	15		37.5	0.5		2.5	0.5		0.5					15.0						
31			37.5							0.5		15.0			0.5					
1			2.5	0.5	37.5	0.5			0.5	2.5	0.5		0.5	15.0						

Table 4. continued

Plot	Species																			
	AMPS	AMTR	ANGE	ASSY	BRIN	CAIN	CAREX	ELCA	EQAR	HOJU	PASM	PAVI	PHAR	POPR	RUCR	SCAM2	SOGI	SPCR	SPPE	TYPH
29	0.5				62.5				0.5					37.5						
34	2.5		37.5	15.0	37.5										2.5		15.0			
47			1.0	1.0	71.0	0.2								11.0	0.2		6.0			
89			15.0		15.0					2.5		15.0	2.5							
87	0.5		37.5		62.5															
28		37.5	37.5	15.0						2.5		2.5		2.5				37.5		
36	0.5		0.5						2.5	37.5		37.5			0.5	0.5	15.0			
4	15.0			2.5								15.0								
5	0.5									2.5									2.5	
40			0.5				0.5													
39							2.5			15.0		15.0			15.0	15.0				
44	0.5			0.5	0.5		0.5			15.0	0.5			15.0		37.5				
8										2.5			15.0	2.5		87.5	2.5			
91					62.5				2.5				37.5		2.5				2.5	
30		0.5		0.5	15.0					2.5					15.0	2.5				87.5
26		2.5											15.0		2.5	62.5			0.5	37.5

AMPS = *Ambrosia psilostachya*AMTR = *A. trifida*ANGE = *Andropogon gerardii*ASSY = *Asclepias syriaca*BRIN = *Bromus inermis*CAIN = *Calamagrostis inexpansa*CAREX = *Carex* sp.ELCA = *Elymus canadensis*EQAR = *Equisetum arvense*HOJU = *Hordeum jubatum*PASM = *Pascoyprum smithii*PAVI = *Panicum virgatum*PHAR = *Phalaris arundinacea*POPR = *Poa pratensis*RUCR = *Rumex crispus*SCAM = *Scirpus americanus*SOGI = *Solidago gigantea*SPCR = *Sporobolus cryptandrus*SPPE = *Spartina pectinata*TYPH = *Typha* spp.

grazing (Figures 14 and 15). In addition, this alliance usually formed an intricate association with the Introduced Grassland Herbaceous Alliances (*Poa pratensis* and *Bromus inermis*) and the *Typha* spp. – *Scirpus* spp. – Mixed Herbs Great Plains Herbaceous Vegetation (Figures 16-21), which further complicated the classification to the association level. The majority of the intricate juxtaposition observed in these communities can be explained by very subtle, but discernable changes in topography. Frith (1974, as cited by Currier) described these patterns as the “wetland meadow complex”. Under these situations, the frequency and abundance of *Andropogon gerardii* and *Panicum virgatum* are generally higher on the slightly raised areas while *Spartina pectinata* and *Carex* sp. are more common within the small, narrow drainages that occur throughout the project area. Topographic changes of only a few inches can produce this relatively common pattern, which is often enhanced by livestock grazing.

Currier (1982) broadly grouped the majority of the perennial herbaceous vegetation under the Meadow Vegetation Types. He further subdivided these types into a variety of classes that included the (1) Marsh Vegetation Type (characterized by *Typha latifolia*, *Scirpus acutus*, and *S. americanus*), (2) Wetland Meadow Type (characterized by *S. americanus*, *Carex* spp. and *Eleocharis palustris*), (3) Grazed Grassland Type (characterized by a variety of native and introduced grasses), and (4) Prairie/Hayfield Type that occupied uncultivated native prairie sites. The classification of the 1999 plot data according to the NVCS appears relatively congruent with Currier’s 1982 classification of the Platte River vegetation, with one exception. The Prairie/Hayfield Types described by Currier were usually found on the drier, more upland sites on the western edge of the project area. Primarily because of lack of access, very few of these prairie types were recorded during the 1999 survey. Currier also reported that most of these

types contained relatively high amounts of introduced grasses (*Poa pratensis* and *Bromus* sp.), which is similar to what was observed during the 1999 survey.

Plot 110 (Figure 23) was classified as a Sand Flats Temporarily Flooded Sparse Vegetation Alliance, which appears similar to the Perennial Mudflat vegetation type described by Currier (1982). This alliance is typically found on exposed sandbars that are slightly elevated above the river channel. Currier also described an Annual Mudflat type that occupied newly exposed mudflats close the river channel and were usually characterized by early successional annual and perennials. This type was not observed during the 1999 survey primarily because of the high water level of the river.

Ordination

Ordination of the plots (DCA, McCune and Mefford 1999) appeared to place the plots along a moisture gradient. Plots that characterize the *Typha* spp. – *Scirpus* spp. – Mixed Herbs Great Plains Herbaceous Vegetation association are located at one end of Axis 1 (Figure 16). Plot distribution along the first axis also seems to be strongly influenced by the abundance of *Poa pratensis*. Plots characterized by *P. pratensis* are located toward the left end of the first axis. The first axis of the ordination accounted about 24% of the variation in the ordination. The location of plots along Axis 2, which contributed an additional 18% to the total the variation of the ordination, appears to be related to the abundance of *Bromus inermis* (plots dominated by *B. inermis* are ordinated at the lower end of the graph). Interpretation of these patterns is complicated by the wide variety of land management strategies that occur within the project area (grazing and fire) and the introduction of a variety of non-native grasses.

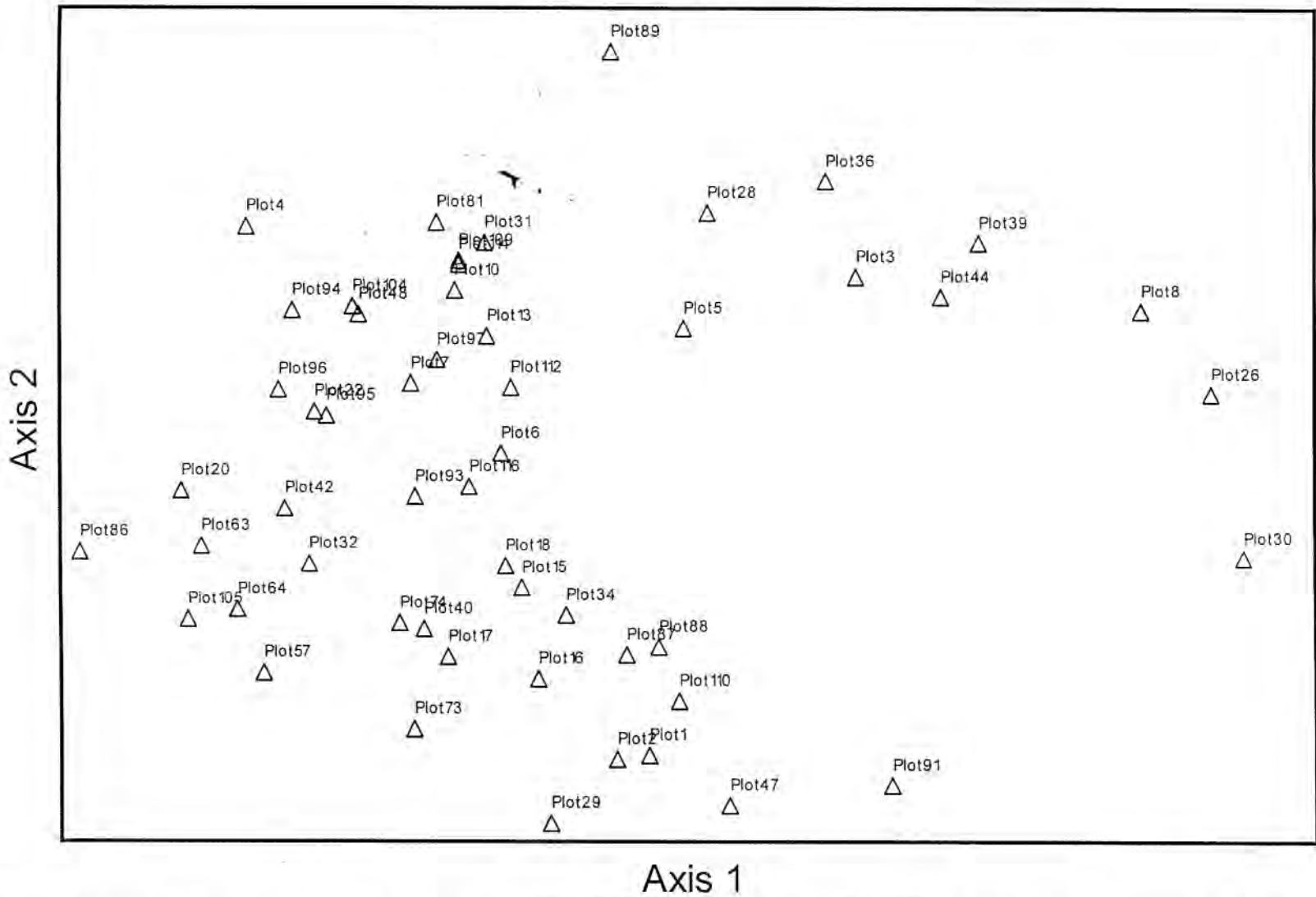


Figure 13. Detrended Correspondence Analysis (DECORANA: McCune and Mefford 1999) ordination of 53 vegetation plots representing the grassland and wet meadow plant communities along the Central Platte River, Nebraska that were evaluated during the 1999 field season. Please see Figure 12 for community names for each plot.



Figure 14. The photographs above (Plot 112 above left, Plot 22 above right) provide grazed examples of the *Andropogon gerardii* (*Calamagrostis Canadensis*, *Panicum virgatum* Herbaceous Alliance. In both cases, it appears that switchgrass and prairie cordgrass were not grazed as heavily as big bluestem. Plot 6 (left) provides a comparable example of a somewhat more lightly grazed plot.



Figure 15. Plot 116 (above) illustrates a grazed *Andropogon gerardii* (*Calamagrostis Canadensis*, *Panicum virgatum* Herbaceous Alliance that contains a substantial amount of Kentucky bluegrass and prairie cordgrass. The visibility of prairie cordgrass in Plot 109 (below) appears to have been enhanced somewhat by grazing.





Figure 16. Plot 3 (above left) is an example of the *Typha* spp. – *Scirpus* spp. Mixed Herbs Great Plains Herbaceous Alliance that contains a mixture of 3-square bulrush, prairie cordgrass, big bluestem, and switchgrass. Plot 104 (above right) is a relatively dry *Andropogon gerardii* (*Calamagrostis Canadensis*, *Panicum virgatum* Herbaceous Alliance grassland sampled on Jeffery island, while Plot 10 (left) is a more mesic example of this alliance with a fairly even mix of big bluestem, switchgrass, and Kentucky bluegrass.



Figure 17. Plot 13 (above left) illustrates an *Andropogon gerardii* (*Calamagrostis Canadensis*, *Panicum virgatum* Herbaceous Alliance that contains an almost pure stand of big bluestem. The vegetation distribution of Plot 7 (above right) is strongly influenced by very slight swales. Plot 2 (left) is an example of an Introduced Grassland with exceptionally high species diversity, especially graminoids.



Figure 18. Plots 15 (above left) and Plot 16 (above right) are examples of the *Andropogon gerardii* (*Calamagrostis Canadensis*, *Panicum virgatum* Herbaceous Alliance that appear to have been burned sometime in the recent past. Plot 17 (left) is a *Andropogon gerardii* (*Calamagrostis Canadensis*, *Panicum virgatum* Herbaceous Alliance that contains a substantial amount of smooth brome and Kentucky Bluegrass.



Figure 19. *Andropogon gerardii* – (*Calamagrostis canadensis*, *Panicum virgatum*) Herbaceous Alliance. Plot 18 (top left) occurs in a slight channel where the density and cover of big bluestem is slightly less than the surrounding upland sites. There was very little standing dead and litter in the plot suggesting that the area had either been previously burned or hayed. Plot 48 (above) is dominated almost exclusively by big bluestem. Plot 88 (left) illustrates a typical Introduced Grassland – *Bromus inermis* Herbaceous Alliance in which the abundance of smooth brome masks the contribution by big bluestem and switchgrass.



Figure 20. Introduced Grassland – *Poa pratensis* Herbaceous Alliance. (Plot 32 left above, plot 86 above, and plot 105 left). Plot 86 above forms an ecotone between a grazed big bluestem pasture and cottonwood forest. A few scattered green ash and Russian olive trees occur in the area. Plot 105 (left) is located on Jeffery Island and contains a substantial amount of woolly mullen. In addition, the plot also contained a substantial amount of musk thistle rosettes.



Plot 1



Plot 29



Plot 34



Plot 87



Plot 89

Figure 21. These photographs illustrate the basic physiognomic characteristics of the Introduced Grasslands observed in the project area. Plots 34 and 87 contain a fairly substantial amount of big bluestem.



Figure 22. Sand Flats Temporarily Flooded Sparse Vegetation Alliance (Plot 110)

Literature Cited

- Currier, P.J. 1982. The floodplain vegetation of the Platte River: phytosociology, forest Development, and seedling establishment. Ph.D. Dissertation. Iowa State University, Ames, IA.
- Friesen, B, J. Von Loh, J. Schrott, J. Butler, D. Crawford, and M. Pucherelli. 2000. Central Platte River 1998 Land Cover/Use Mapping Project Nebraska. Remote Sensing and Geographic Information System Group, U.S. Bureau of Reclamation, Technical Service Center. Technical Memorandum No. 8260-00-08.
- Frith, C.R. 1974. The ecology of the Platte River as related Sandhill Cranes and other waterfowl in south central Nebraska. MS. Thesis. Kearney State College, Kearney, NE.
- Gauch, H.G. 1982. Multivariate analysis in community ecology. Cambridge University Press, New York.
- Grossman, D.H., D. Faber-Langenodoen, A.S. Weakley, M. Anderson, P. Bourgeron, R. Crawford, K. Goodin, S. Landaal, K. Metzler, K. Patterson, M. Pyne, M. Reid, and L. Sneddon. 1998. International classification of ecological communities: terrestrial vegetation of the United States. Volume I. The National Vegetation Classification System: development, status, and applications. The Nature Conservancy, Arlington, Virginia, USA.
- McCune, B., and M.J. Mefford. 1999. PC-ORD. Multivariate Analysis of Ecological Data, Version 4. MjM Software Design, Gleneden Beach, Oregon, USA.
- NatureServe: An online encyclopedia of life [web application]. 2000. Version 1.2. Arlington, Virginia, USA: Association for Biodiversity Information. Available: <http://www.natureserve.org/>. (Accessed: April 4, 2001).

Appendix A:

**Descriptions for the Vegetation Associations found along the Central Platte River:
National Vegetation Classification System
(<http://www.natureserve.org>)**

Scientific Name: Fraxinus pennsylvanica - Ulmus spp. - Celtis occidentalis Forest
Translated Scientific Name: Green Ash - Elm species - Northern Hackberry Forest
Common Name: Central Green Ash - Elm - Hackberry Forest
Unique Identifier: CEG002014
Classification Code: I.B.2.N.d.11
Association Classification Confidence Level: Moderate

Association Summary: This community is found in the central United States along upper floodplain terraces of rivers and streams and in upland ravine bottoms. Soils are moderately well-drained to poorly drained. Tree canopies are dominated by Fraxinus pennsylvanica, Celtis occidentalis, and Ulmus americana. Other tree species that may be present include Juglans nigra, Tilia americana, Acer saccharinum, Populus deltoides. Ulmus rubra can be part of the subcanopy. The shrub layer in the western part of the range includes Cornus drummondii, Ribes missouriense, Symphoricarpos occidentalis, and Zanthoxylum americanum, as well as woody vines, such as Parthenocissus vitacea, Smilax tamnoides (= Smilax hispida), Toxicodendron radicans, and Vitis riparia. The herbaceous layer in the western part of its range includes Elymus virginicus, Festuca subverticillata, Galium aparine, Geum canadense, and Laportea canadensis.

Ecological System

Terrestrial

Formation Class

I - Forest

Formation Subclass

I.B - Deciduous forest

Formation Name

I.B.2.N.d - Temporarily flooded cold-deciduous forest

Alliance Name

I.B.2.N.d.11 - FRAXINUS PENNSYLVANICA - ULMUS AMERICANA - CELTIS (OCCIDENTALIS, LAEVIGATA) TEMPORARILY FLOODED FOREST ALLIANCE

Global Heritage Status Rank Summary

Global Heritage Status Rank: G3G5

Distribution

Nation: United States

United States Distribution: IA, IL, IN, KS, MI, NE, OH:?

Nation: Canada

Canadian Province Distribution: ON

Global Range Comments: This community is found in the central United States along upper floodplain terraces of rivers and streams and in upland ravine bottoms, ranging from Ohio and Ontario west to Iowa, south to Kansas, and east to Indiana.

Authors/Contributors

Element Description Author(s): D. Faber-Langendoen

ABI and TNC Regional Ecologists, Midwestern Region.

References

Steinauer, G., and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Draft - October 28, 1997. Nebraska Game and Parks Commission, Lincoln, NE. 117 pp.

Scientific Name: *Populus deltoides* - *Fraxinus pennsylvanica* Forest

Translated Scientific Name: Eastern Cottonwood - Green Ash Forest

Common Name: Cottonwood - Green Ash Floodplain Forest

Unique Identifier: CEGLO00658

Classification Code: I.B.2.N.d.15

Association Classification Confidence Level: Weak

Association Summary: This cottonwood - green ash riparian forest community occurs throughout the northern and central Great Plains of the United States and adjacent Canada. Stands occur along rivers and streams and around ponds and lakes. The alluvial soils are variable, with silty clay loam, clay loam, clay, and loam soils in the northern Plains and sandy soils in the central Plains. It is a riparian open to closed-canopy forest dominated by deciduous trees. *Populus deltoides* and *Fraxinus pennsylvanica* are the most abundant mature trees. *Acer negundo* and *Ulmus americana* may also be present in the tree layer. *Juniperus scopulorum* may occur in the western portion of this community's range, and *Juniperus virginiana* in the eastern part. This community is dynamic and in younger stands *Populus deltoides* is the dominant but as stands age *Fraxinus pennsylvanica* becomes more prominent. The shrub layer is often vigorous. Species such as *Rosa woodsii*, *Symphoricarpos occidentalis*, *Juniperus scopulorum*, *Juniperus communis*, *Prunus virginiana*, *Cornus drummondii*, and *Cornus sericea* ssp. *sericea* can be abundant. *Carex* spp., *Juncus* spp., *Leymus cinereus*, *Lysimachia ciliata*, *Thalictrum venulosum*, and *Elymus canadensis* are common in the northern Plains, and *Amphicarpaea bracteata*, *Carex blanda*, *Geum canadense*, *Parietaria pensylvanica* and others in the central Plains. Weedy species are almost ubiquitous, especially *Poa pratensis*, *Bromus inermis*, *Melilotus officinalis*, *Ambrosia* spp., and *Urtica* spp.

Ecological System

Terrestrial

Formation Class

I - Forest

Formation Subclass

I.B - Deciduous forest

Formation Name

I.B.2.N.d - Temporarily flooded cold-deciduous forest

Alliance Name

I.B.2.N.d.15 - **POPULUS DELTOIDES TEMPORARILY FLOODED FOREST ALLIANCE**

Global Heritage Status Rank Summary

Global Heritage Status Rank: G2G3

Global Heritage Status Rank Reasons: The total number of occurrences is unknown. Three have been documented in Nebraska, where the community is ranked S3. Although no other occurrences have been documented, the community is also reported from Montana and may occur in North Dakota (SP), South Dakota (SP), and Saskatchewan (SP). It occurs in nine

northern Great Plains ecoregional sections. The community is found on a variety of soils along streams and rivers and around ponds and lakes.

Distribution

Nation: United States

United States Distribution: MT, ND, NE, SD

Nation: Canada

Canadian Province Distribution: MB:?, SK:?

Global Range Comments: This cottonwood - green ash riparian forest community occurs throughout the northern and central Great Plains of the United States and adjacent Canada, ranging from the Dakotas northwest to Montana and Saskatchewan, and south to Nebraska.

Authors/Contributors

Element Description Author(s): Faber-Langendoen, D.

ABI and TNC Regional Ecologists, Midwestern Region.

References

- Eyre, F. H., editor. 1980. Forest cover types of the United States and Canada. Society of American Foresters, Washington, DC. 148 pp.
- Girard, M. M. 1985. Native woodland ecology and habitat type classification of southwestern North Dakota. Ph.D. thesis. North Dakota State University, Fargo.
- Girard, M. M., H. Goetz, and A. J. Bjugstad. 1989. Native woodland habitat types of southwestern North Dakota. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Research Paper RM-281. Fort Collins, CO. 36 pp.
- Hansen, P. L., G. R. Hoffman, and A. J. Bjugstad. 1984. The vegetation of Theodore Roosevelt National Park, North Dakota: A habitat type classification. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. General Technical Report RM-113. Fort Collins, CO. 35 pp.
- Hansen, P. L., K. Bogs, R. Pfister, and J. Joy. 1990. Classification and management of riparian and wetland sites in central and eastern Montana. Draft version 2. Montana Riparian Association, Montana Forest and Conservation Experiment Station, School of Forestry. University of Montana, Missoula, MT. 279 pp.
- Johnson, W. C. 1971. The forest overstory vegetation on the Missouri River floodplain in North Dakota. Ph.D. thesis. North Dakota State University, Fargo, ND.

- Johnston, B. C. 1987. Plant associations of Region Two: Potential plant communities of Wyoming, South Dakota, Nebraska, Colorado, and Kansas. R2-ECOL-87-2. USDA Forest Service, Rocky Mountain Region. Lakewood, CO. 429 pp.
- Keammerer, W. R. 1972. The understory vegetation of the bottomland forests of the Missouri River in North Dakota. Ph.D. thesis. North Dakota State University, Fargo. 234 pp.
- Montana Natural Heritage Program. No date. Unpublished data on file. Helena, MT.
- South Dakota Geological Survey. No date. Major physiographic divisions of South Dakota. Educational Series, Map 4. Pierre, SD.
- Steinauer, G., and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Draft - October 28, 1997. Nebraska Game and Parks Commission, Lincoln, NE. 117 pp.

Scientific Name: Riverine Sand Flats-Bars Sparse Vegetation
Translated Scientific Name: Riverine Sand Flats-Bars Sparse Vegetation
Common Name: Riverine Sand Flats
Unique Identifier: CEGL002049
Classification Code: VII.C.2.N.c.1
Association Classification Confidence Level: Weak

Association Summary: This community ranges from the western Great Plains to the eastern parts of the midwestern United States and Canada. It is a sparsely vegetated community that occurs along river shorelines, islands, pointbars, and flats. These sandbars form when receding floodwaters deposit sand and lesser amounts of clay, silt, and cobbles in the stream bed. Soils are often undeveloped due to the ephemeral nature of the stands. Drainage depends on depth above the water level. Herbaceous species shared in Missouri and Nebraska include *Cyperus* spp. (*Cyperus erythrorhizos*, *Cyperus odoratus*, *Cyperus squarrosus*), *Eragrostis hypnoides*, *Eragrostis trichodes*, *Leptochloa fascicularis*, *Polygonum* spp. (including *Polygonum lapathifolium*), *Rorippa sinuata*, *Sporobolus cryptandrus*, and *Xanthium strumarium*.

Ecological System

Terrestrial

Formation Class

VII - Sparse Vegetation

Formation Subclass

VII.C - Unconsolidated material sparse vegetation

Formation Name

VII.C.2.N.c - Temporarily flooded sand flats

Alliance Name

VII.C.2.N.c.1 - SAND FLATS TEMPORARILY FLOODED SPARSE VEGETATION ALLIANCE

Global Heritage Status Rank Summary

Global Heritage Status Rank: G4G5

Distribution

Nation: United States

United States Distribution: IL, IN, KS, MN, MO, NE, WY:?

Nation: Canada

Canadian Province Distribution: MB:?, ON, SK:?

Global Range Comments: This community is found from the western Great Plains to the eastern parts of the midwestern United States and Canada, ranging from Indiana northwest to Saskatchewan, and south to Kansas.

Authors/Contributors

Element Description Author(s): D. Faber-Langendoen

ABI and TNC Regional Ecologists, Midwestern Region.

References

Nelson, P. W. 1985. The terrestrial natural communities of Missouri. Missouri Natural Areas Committee, Jefferson City. 197 pp.

Steinauer, G., and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Draft - October 28, 1997. Nebraska Game and Parks Commission, Lincoln, NE. 117 pp.

Scientific Name: *Cornus drummondii* - *Amorpha fruticosa* - *Cornus sericea* Shrubland
 ranslated Scientific Name: Roughleaf Dogwood - Tall Indigobush - Red-osier Dogwood
 Shrubland

Common Name: Dogwood Floodplain Shrubland

Unique Identifier: CEG005220

Classification Code: III.B.2.N.d.27

Association Classification Confidence Level: Weak

Association Summary: This dogwood shrubland community is found along rivers and streams in the central Great Plains of the United States. It is found along high banks, raised islands, and terraces above the stream channel, which experience periodic flooding in late winter or spring. Soils are moderately well-drained and formed in alluvium. Vegetation consists of patches of moderate to locally dense of cold-deciduous shrubs 2-3 m tall. *Amorpha fruticosa* and *Cornus drummondii* dominate the stands, with scattered patches of *Cornus sericea*, *Salix exigua* and *Populus deltoides* saplings. Herbaceous understory varies in response to flooding. Sedges, such as *Carex cristatella*, *Carex emoryi*, and *Carex lanuginosa* (= *Carex pellita*), are found with mesophytic grasses, such as *Panicum virgatum* and *Andropogon gerardii*. In more xeric habitats, weedy annual forbs, such as *Ambrosia artemisiifolia*, may be abundant, whereas wetter sites are dominated by forbs typical of marshes, e.g. *Impatiens capensis*, *Mentha arvensis*.

Ecological System

Terrestrial

Formation Class

III - Shrubland

Formation Subclass

III.B - Deciduous shrubland

Formation Name

III.B.2.N.d - Temporarily flooded cold-deciduous shrubland

Alliance Name

III.B.2.N.d.27 - CORNUS SERICEA TEMPORARILY FLOODED SHRUBLAND
 ALLIANCE

Global Heritage Status Rank Summary

Global Heritage Status Rank: G4?

Global Heritage Status Rank Reasons: Rank is based on the state rank in Nebraska. Further review is needed.

Distribution

Nation: United States

United States Distribution: NE

Global Range Comments: This community is found along rivers and streams in the central Great Plains, particularly Nebraska.

Authors/Contributors

Element Description Author(s): G. Steinauer and S. Rolfsmeier

ABI and TNC Regional Ecologists, Midwestern Region.

References

Currier, P. J. 1982. The floodplain vegetation of the Platte River: Phytosociology, forest development, and seedling establishment (Nebraska).

Steinauer, G., and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Draft - October 28, 1997. Nebraska Game and Parks Commission, Lincoln, NE. 117 pp.

Scientific Name: *Salix exigua* Temporarily Flooded Shrubland
Translated Scientific Name: Coyote Willow Temporarily Flooded Shrubland
Common Name: Sandbar Willow Shrubland
Unique Identifier: CEGL001197
Classification Code: III.B.2.N.d.6
Association Classification Confidence Level: Strong

Association Summary: This willow shrubland community is found along rivers and streams at lower elevations throughout the northwestern United States and Great Plains. This type is an early successional stage that occurs on recently flooded riparian areas. Stands occur most commonly on alluvial sand, but silt, clay, or gravel may also be present. *Salix exigua* is the dominant canopy species. It can form dense stands up to 4 meters tall, but there are often patches where the shrub layer is absent. Seedlings and small saplings of *Populus deltoides* and *Salix amygdaloides* may be present. The herbaceous cover is sparse to moderate, but rarely exceeds 30%. Species present include *Cenchrus longispinus*, *Polygonum lapathifolium*, *Scirpus americanus*, *Triglochin maritimum*, and *Xanthium strumarium*. The composition of this community, especially the herbaceous layer, varies from year to year with succession or renewed disturbance.

Ecological System

Terrestrial

Formation Class

III - Shrubland

Formation Subclass

III.B - Deciduous shrubland

Formation Name

III.B.2.N.d - Temporarily flooded cold-deciduous shrubland

Alliance Name

III.B.2.N.d.6 - SALIX EXIGUA TEMPORARILY FLOODED SHRUBLAND

ALLIANCE

Global Heritage Status Rank Summary

Global Heritage Status Rank: G5

Global Heritage Status Rank Reasons: This type is widespread and common throughout its range.

Distribution

Nation: United States

United States Distribution: AR, IA, ID, IL:?, MT, ND, NE, OK, OR, SD, WA, WY

Nation: Canada

Canadian Province Distribution: MB

Global Range Comments: This sandbar willow shrubland community is found along rivers and streams at lower elevations throughout the northwestern United States and Great Plains, ranging sporadically from Illinois northwest to the Dakotas and Manitoba, west to Washington, and south to Oklahoma.

Authors/Contributors

Element Description Author(s): Drake, J. F.

ABI and TNC Regional Ecologists, Western Region.

References

- Bellah, R. G., and L. C. Hulbert. 1974. Forest succession on the Republican River floodplain in Clay County, Kansas. *Southwestern Naturalist*. 19(2):155-166.
- Evenden, A. G. 1990. Ecology and distribution of riparian vegetation in the Trout Creek Mountains of southeastern Oregon. Ph.D. dissertation. Oregon State University, Corvallis. 156 pp.
- Foti, T., M. Blaney, X. Li, and K. G. Smith. 1994. A classification system for the natural vegetation of Arkansas. *Proceedings of the Arkansas Academy of Science* 48:50-53
- Hansen, P. L., R. D. Pfister, K. Boggs, B. J. Cook, J. Joy, and D. K. Hinckley. 1995. Classification and management of Montana's riparian and wetland sites. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Miscellaneous Publication No. 54. 646 pp.
- Hansen, P., K. Boggs, and R. Pfister. 1991. Classification and management of riparian and wetland sites in Montana. Unpublished draft version prepared for Montana Riparian Association, Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Missoula. 478 pp.
- Hansen, P., R. Pfister, J. Joy, D. Svoboda, K. Boggs, L. Myers, S. Chadde, and J. Pierce. 1989. Classification and management of riparian sites in southwestern Montana. Unpublished draft prepared for the Montana Riparian Association, School of Forestry, University of Montana, Missoula. 292 pp.
- Hoagland, B. W. 1997. Preliminary plant community classification for Oklahoma. Unpublished draft document, version 35629. University of Oklahoma, Oklahoma Natural Heritage Inventory, Norman. 47 pp.
- Kittel, G. M., and N. D. Lederer. 1993. A preliminary classification of the riparian vegetation of the Yampa and San Miguel/Dolores river basins. Unpublished report prepared for

- Colorado Department of Health and the Environmental Protection Agency by The Nature Conservancy, Colorado Field Office, Boulder.
- Kovalchik, B. L. 1987. Riparian zone associations - Deschutes, Ochoco, Fremont, and Winema national forests. USDA Forest Service Technical Paper 279-87. Pacific Northwest Region, Portland, OR. 171 pp.
- Phillips, C. M. 1977. Willow carrs of the upper Laramie River Valley, Colorado. Unpublished thesis. Colorado State University, Fort Collins. 71 pp.
- Steinauer, G. 1989. Characterization of the natural communities of Nebraska. Appendix D, pages 103-114 in: M. Clausen, M. Fritz, and G. Steinauer. The Nebraska Natural Heritage Program, two year progress report. Unpublished document. Nebraska Game and Parks Commission, Natural Heritage Program, Lincoln, NE.
- Steinauer, G., and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Draft - October 28, 1997. Nebraska Game and Parks Commission, Lincoln, NE. 117 pp.
- The Nature Conservancy. 1991. North Dakota state community abstract - pioneer riparian community. The Nature Conservancy, Midwest Regional Office, Minneapolis, MN.
- Wilson, R. E. 1970. Succession in stands of *Populus deltoides* along the Missouri River in southeastern South Dakota. *The American Midland Naturalist* 83(2):330-342.

Scientific Name: *Populus deltoides* - (*Salix amygdaloides*) / *Salix exigua* Woodland

Translated Scientific Name: Eastern Cottonwood - (Peachleaf Willow) / Coyote Willow Woodland

Common Name: Cottonwood - Peach-Leaf Willow Floodplain Woodland

Unique Identifier: CEG000659

Classification Code: II.B.2.N.b.4

Association Classification Confidence Level: Moderate

Association Summary: This cottonwood - willow woodland is found widely in the central Great Plains of the United States. Stands occur on recently deposited alluvial material along rivers and streams. The soils are derived from alluvial sand, silt, and clay and are poorly developed. The water table fluctuates with the level of the adjacent river or stream. *Populus deltoides* is the dominant species in this community, although *Salix exigua* is generally more dominant in the initial stage following a major flood event. *Salix amygdaloides* is rare to codominant. The shrub/sapling layer is conspicuous, especially near the streambank, and consists mainly of *Salix exigua*, *Populus deltoides*, and *Salix amygdaloides*, or occasionally *Salix lutea*. On the older margins of this community *Fraxinus pennsylvanica* is often found as a sapling or small canopy tree. The herbaceous stratum is variable. Graminoids typical of undisturbed sites include *Carex emoryi*, *Carex pellita*, *Pascopyrum smithii*, and *Spartina pectinata*. *Equisetum arvense* and *Glycyrrhiza lepidota* are common forbs in these sites. Widely distributed species that are adapted to these sites include *Ambrosia psilostachya*, *Artemisia campestris* ssp. *caudata*, *Artemisia ludoviciana*, *Calamovilfa longifolia*, *Cenchrus longispinus*, *Chamaesyce serpyllifolia* (= *Euphorbia serpyllifolia*), *Euphorbia esula*, *Grindelia squarrosa*, *Helianthus petiolaris*, *Heterotheca villosa*, *Phyla lanceolata* (= *Lippia lanceolata*), *Opuntia macrorhiza*, *Poa pratensis*, and *Sporobolus cryptandrus*. These sites are prone to invasion by exotic grasses and forbs, the most widely established being *Agrostis stolonifera*, *Bromus tectorum*, *Cirsium arvense*, *Kochia scoparia*, *Melilotus* spp., *Taraxacum officinale*, and *Tragopogon dubius*.

Ecological System

Terrestrial

Formation Class

II - Woodland

Formation Subclass

II.B - Deciduous woodland

Formation Name

II.B.2.N.b - Temporarily flooded cold-deciduous woodland

Alliance Name

II.B.2.N.b.4 - **POPULUS DELTOIDES TEMPORARILY FLOODED WOODLAND ALLIANCE**

Global Heritage Status Rank Summary

Global Heritage Status Rank: G3G4

Global Heritage Status Rank Reasons: In the absence of regular flooding, many sites will undergo succession to later seral stages. Many sites are overgrazed and invaded by exotic woody and herbaceous species.

Distribution

Nation: United States

United States Distribution: CO, KS, ND, NE, NM:?, OK:?, SD:?, TX:?

Nation: Canada

Canadian Province Distribution: MB:?, SK:?

Global Range Comments: This cottonwood - willow woodland is found widely in the central Great Plains, especially Colorado, Nebraska, Kansas, and Oklahoma, and possibly both north and south of this region.

Authors/Contributors

Global Ranking Factors Edition Date: 22Jun1998

Element Description Author(s): Drake, J. F., S. B. Rolfsmeier

ABI and TNC Regional Ecologists, Midwestern Region.

References

- Bellah, R. G., and L. C. Hulbert. 1974. Forest succession on the Republican River floodplain in Clay County, Kansas. *Southwestern Naturalist*. 19(2):155-166.
- Bunin, J. E. 1985. Vegetation of the City of Boulder, Colorado open space lands. Report prepared for the City of Boulder, Real Estate/Open Space, Boulder, CO. 114 pp.
- Burgess, R. L., W. C. Johnson, and W. R. Keammerer. 1973. Vegetation of the Missouri River floodplain in North Dakota. Department of Botany, North Dakota State University, Fargo.
- Christy, S. 1973. An analysis of the woody vegetation on the South Platte River flood plain in northeastern Colorado. Unpublished thesis. University of Northern Colorado, Greeley. 82 pp.
- Cooper, D. J. 1988. Advanced identification of wetlands in the City of Boulder Comprehensive Planning Area. Unpublished technical report prepared for U.S. Environmental Protection Agency, Region VIII and the City of Boulder, CO.
- Crouch, G. L. 1961. Inventory and analysis of wildlife populations and habitat, South Platte River Valley. Final report, Federal Aid in Wildlife Restoration, Project W-104-R-1-2, Colorado Game and Fish Department. 68 pp.

- Crouch, G. L. 1961. Wildlife populations and habitat conditions on grazed and ungrazed bottomlands in Logan County, Colorado. Unpublished thesis. Colorado State University, Fort Collins.
- Crouch, G. L. 1978. Effects of protection from livestock grazing on a bottomland wildlife habitat in northeastern Colorado. Pages 118-125 in: Lowland river and stream habitat in Colorado: A symposium. Greeley, CO. 4-5 October 1978.
- Crouch, G. L. 1979. Changes in the vegetation complex of a cottonwood ecosystem on the South Platte River. Pages 19-22 in: Riparian and wetland habitats of the Great Plains: Proceedings of the 31st annual meeting. Great Plains Agricultural Council Publication 91. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.
- Crouch, G. L. 1979. Long-term changes in cottonwoods on a grazed and an ungrazed plains bottomland in northeastern Colorado. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Research Note RM-370. Fort Collins, CO. 4 pp.
- Currier, P. J. 1982. The floodplain vegetation of the Platte River: Phytosociology, forest development, and seedling establishment (Nebraska).
- Fitzgerald, J. P. 1978. Vertebrate associations in plant communities along the South Platte River in northeastern Colorado. Pages 73-88 in: W. D. Gaul and J. Bissell, editors. Lowland River and Stream Habitat in Colorado: A symposium, Greeley, Colorado, October 4-5, 1978. Colorado Chapter of the Wildlife Society and Colorado Audubon Council.
- Hefley, H. M. 1937. Ecological studies on the Canadian River floodplain in Cleveland County, Oklahoma. *Ecological Monographs* 7:347-402.
- Hoagland, B. W. 1997. Preliminary plant community classification for Oklahoma. Unpublished draft document, version 35629. University of Oklahoma, Oklahoma Natural Heritage Inventory, Norman. 47 pp.
- Jackson, J. R. 1972. Vegetation of the flood plain of the South Platte River in the proposed Narrows Reservoir site. Unpublished thesis. University of Northern Colorado, Greeley. 83 pp.
- Jackson, J. R., and I. E. Lindauer. 1978. Vegetation of the flood plain of the south Platte River in the proposed Narrows Reservoir site. *Transactions of the Mississippi Academy of Science* 12:37-46.
- Johnson, W. C. 1994. Woodland expansion in the Platte River, Nebraska: Patterns and causes. *Ecological Monographs* 64(1):45-84.

- Johnston, B. C. 1987. Plant associations of Region Two: Potential plant communities of Wyoming, South Dakota, Nebraska, Colorado, and Kansas. R2-ECOL-87-2. USDA Forest Service, Rocky Mountain Region. Lakewood, CO. 429 pp.
- Jones, G. P., and G. M. Walford. 1995. Major riparian vegetation types of eastern Wyoming. Submitted to Wyoming Department of Environmental Quality, Water Quality Division. Wyoming Natural Diversity Database, Laramie, WY. 245 pp.
- Knopf, F. L. 1985. Significance of riparian vegetation to breeding birds along an altitudinal cline. Pages 105-111 in: R. R. Johnson, et al., editors. Riparian ecosystems and their management. USDA Forest Service General Technical Report RM-120.
- Lindauer, I. E. 1970. The vegetation of the flood plain of the Arkansas River in southeastern Colorado. Unpublished dissertation. Colorado State University, Fort Collins. 92 pp.
- Lindauer, I. E. 1978. A comparison of the vegetative communities of the South Platte and Arkansas River drainages in eastern Colorado. Pages 56-72 in: W. D. Graul and S. J. Bissel, editors. Lowland River and Stream Habitat in Colorado: A Symposium, 4-5 October 1978. Colorado Chapter of Wildlife Society and Audubon Council.
- Lindauer, I. E., J. P. Fitzgerald, and L. L. Lindauer. 1973. Ecological analyses of flood plain communities, Narrows Reservoir Site, Colorado. Unpublished report to U.S. Bureau of Reclamation, Denver, CO, by the University of Northern Colorado, Department of Biology, Greeley. 108 pp.
- Lindauer, I. E., and J. P. Fitzgerald. 1974. Ecological survey and analysis of terrestrial communities at the Weld County (Hardin) proposed reservoir site. Unpublished report to U.S. Bureau of Reclamation, Denver, CO, by University of Northern Colorado, Greeley. 45 pp.
- Lindauer, I. E., and S. J. Christy. 1972. An analysis of the woody vegetation on the South Platte River floodplain in northeastern Colorado. Unpublished report to the U.S. Bureau of Reclamation, Denver, CO, by the University of Northern Colorado, Biology Department, Greeley.
- McAdams, A. G., D. A. Stutzman, and D. Faber-Langendoen. 1998. Black Hills Community Inventory, unpublished data. The Nature Conservancy, Midwest Regional Office, Minneapolis, MN.
- Ramaley, F. 1939. Sand-hill vegetation of northeastern Colorado. *Ecological Monographs* 9:1-51.
- Steinauer, G. 1989. Characterization of the natural communities of Nebraska. Appendix D, pages 103-114 in: M. Clausen, M. Fritz, and G. Steinauer. The Nebraska Natural Heritage Program, two year progress report. Unpublished document. Nebraska Game and Parks Commission, Natural Heritage Program, Lincoln, NE.

Scientific Name: *Andropogon gerardii* - *Panicum virgatum* - *Helianthus grosseserratus*
Herbaceous Vegetation

Translated Scientific Name: Big Bluestem - Switchgrass - Sawtooth Sunflower Herbaceous
Vegetation

Common Name: Central Wet-mesic Tallgrass Prairie

Unique Identifier: C EGL002024

Classification Code: V.A.5.N.a.1

Association Classification Confidence Level: Moderate

Association Summary: This wet-mesic tallgrass prairie community is found widely throughout the central midwestern United States. Stands typically occur in narrow draws of headwaters of small streams, depressions of terraces (sometimes uplands), and on floodplains of larger streams and rivers. The loamy soils are somewhat poorly drained and deep (100 cm or more). Standing surface water may be present for short periods in the winter and spring or after heavy rains. Fire was common in this community. There is a single layer of dominant graminoids intermixed with abundant forbs. *Andropogon gerardii* and *Spartina pectinata* can exceed 2 m in height in this wet-mesic community. *Panicum virgatum* is usually somewhat shorter but still greater than 1 m tall. Other typical plants found in this community in Missouri are *Juncus interior*, *Tripsacum dactyloides*, *Helianthus grosseserratus*, *Potentilla simplex*, *Eryngium yuccifolium*, and *Carex bicknellii*. *Calamagrostis canadensis* is more common northward. Species diversity does not tend to be as high as in more mesic grassland communities. Woody species can become more abundant in the absence of fire.

Ecological System

Terrestrial

Formation Class

V - Herbaceous Vegetation

Formation Subclass

V.A - Perennial graminoid vegetation

Formation Name

V.A.5.N.a - Tall sod temperate grassland

Alliance Name

V.A.5.N.a.1 - ANDROPOGON GERARDII - (CALAMAGROSTIS CANADENSIS, PANICUM VIRGATUM) HERBACEOUS ALLIANCE

Global Heritage Status Rank Summary

Global Heritage Status Rank: G2G3

Global Heritage Status Rank Reasons: One hundred and nineteen occurrences have been documented: 2 in Iowa (where the community is ranked S1), 22 in Illinois (S1,S1), 7 in Michigan (S2), 23 in Missouri (S1), 26 in Nebraska (S2), and 39 in Wisconsin (S2). Although no other occurrences have been documented, the community is reported in Minnesota (S1S2) and Oklahoma (S?), probably occurs in Kansas, and possibly occurs in Arkansas and Indiana (both SP). It occurs in 31 ecoregional subsections. Sizes of 107 occurrences range from 1 to 1000 acres, totaling 5700 acres. Two possible occurrences in Kansas are 15 and 13,000 acres. This community has nearly been eliminated. Most areas have been converted to cropland. Lack of

fire may permit increased dominance by woody species. The community is found in shallow depressions, usually near streams or rivers, with deep, poorly-drained, loamy soils. Surface water is often present after heavy rain in winter and spring.

Distribution

Nation: United States

United States Distribution: AR, IA, IL, IN, KS:?, KY:?, MI, MN, MO, NE, OK, WI

Global Range Comments: This wet-mesic tallgrass prairie community is found widely throughout the central midwestern United States, extending from Indiana northwest to Minnesota, south to possibly Kansas and Arkansas, and east to possibly Kentucky.

Authors/Contributors

Element Description Author(s): Drake, J., D. Faber-Lange

ABI and TNC Regional Ecologists, Midwestern Region.

References

- Allard, D. J. 1990. Southeastern United States ecological community classification. Interim report, Version 1.2. The Nature Conservancy, Southeast Regional Office, Chapel Hill, NC. 96 pp.
- Evans, M. 1991. Kentucky ecological communities. Draft report to the Kentucky Nature Preserves Commission. 19 pp.
- Foti, T., M. Blaney, X. Li, and K. G. Smith. 1994. A classification system for the natural vegetation of Arkansas. *Proceedings of the Arkansas Academy of Science* 48:50-53.
- Foti, T., compiler. 1994. Natural vegetation classification system of Arkansas, draft five. Unpublished document. Arkansas Natural Heritage Commission, Little Rock. 8 pp.
- Hladek, K. L., G. K. Hulett, and G. W. Tomanek. 1972. The vegetation of remnant shale-limestone prairies in western Kansas. *Southwestern Naturalist* 17(1):1-10.
- Hoagland, B. W. 1997. Preliminary plant community classification for Oklahoma. Unpublished draft document, version 35629. University of Oklahoma, Oklahoma Natural Heritage Inventory, Norman. 47 pp.
- Lauver, C. L., K. Kindscher, D. Faber-Langendoen, and R. Schneider. 1997. A classification of the natural vegetation of Kansas. Draft. Kansas Biological Survey, Lawrence, KS. 46 pp.
- Minnesota Natural Heritage Program. 1993. Minnesota's native vegetation: A key to natural communities. Version 1.5. Minnesota Department of Natural Resources, Natural Heritage Program, St. Paul, MN. 110 pp.

- Nelson, P. W. 1985. The terrestrial natural communities of Missouri. Missouri Natural Areas Committee, Jefferson City. 197 pp.
- Smith, D. D. 1981. Iowa prairie--An endangered ecosystem. Proceedings of the Iowa Academy of Science 88(1):7-10.
- Steinauer, G., and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Draft - October 28, 1997. Nebraska Game and Parks Commission, Lincoln, NE. 117 pp.
- The Nature Conservancy. 1991. Kansas state community abstract - Dakota Hills tallgrass prairie. The Nature Conservancy, Midwest Regional Office, Minneapolis, MN.
- The Nature Conservancy. 1991a. Michigan state community abstract - wet-mesic prairie. The Nature Conservancy, Midwest Regional Office, Minneapolis, MN.
- Weakley, A. S., K. D. Patterson, S. Landaal, M. Pyne, and others, compilers. 1998. International classification of ecological communities: Terrestrial vegetation of the Southeastern United States. Working draft of March 1998. The Nature Conservancy, Southeast Regional Office, Southern Conservation Science Department, Community Ecology Group. Chapel Hill, NC. 689 pp.
- Weaver, J. E. 1958. Native grassland of southwestern Iowa. Ecology 39(4):733-750.
- White, J., and M. Madany. 1978. Classification of natural communities in Illinois. Pages 311-405 in: Natural Areas Inventory technical report: Volume I, survey methods and results. Illinois Natural Areas Inventory, Urbana, IL.

Scientific Name: *Andropogon gerardii* - *Panicum virgatum* Sandhills Herbaceous Vegetation

Translated Scientific Name: Big Bluestem - Switchgrass Sandhills Herbaceous Vegetation

Common Name: Sandhills Wet-mesic Prairie

Unique Identifier: CEG002023

Classification Code: V.A.5.N.a.1

Association Classification Confidence Level: Weak

Association Summary: This big bluestem sandhills prairie community type occurs in the central Great Plains of the United States. Stands typically occur in interdunal valleys and floodplains of streams and rivers, and on level ground where drainage systems are poorly developed. Soils are somewhat poorly drained sandy loam or sands with organic matter (but no peat accumulation) and are formed in eolian sand or alluvium. Vegetation cover is dense and is primarily composed of tall mesophytic grasses, mostly *Andropogon gerardii* and *Sorghastrum nutans* in undisturbed sites, with *Agrostis stolonifera*, *Phleum pratense*, and *Poa pratensis* often replacing them in disturbed sites. Other common grasses include *Calamagrostis canadensis*, *Calamagrostis stricta*, *Elymus trachycaulus*, and *Panicum virgatum*. Typical forbs include *Helianthus nuttallii*, *Lotus unifoliolatus*, and *Rudbeckia hirta*. Thickets of shrubs, such as *Salix exigua*, are occasional.

Ecological System

Terrestrial

Formation Class

V - Herbaceous Vegetation

Formation Subclass

V.A - Perennial graminoid vegetation

Formation Name

V.A.5.N.a - Tall sod temperate grassland

Alliance Name

V.A.5.N.a.1 - ANDROPOGON GERARDII - (CALAMAGROSTIS CANADENSIS, PANICUM VIRGATUM) HERBACEOUS ALLIANCE

Global Heritage Status Rank Summary

Global Heritage Status Rank: G3?

Global Heritage Status Rank Reasons: Many sites in the eastern portion of the range of this community have been converted to cropland. Excessive center-pivot irrigation may lower the water table enough to convert some remaining sites to dry prairie communities. Most remaining sites have been seeded to exotic grasses and legumes.

Distribution

Nation: United States

United States Distribution: NE, SD

Global Range Comments: This big bluestem sandhills community type occurs in the central Great Plains of the United States, particularly in the Sandhills region of Nebraska and adjacent South Dakota.

Authors/Contributors

Element Description Author(s): J. Drake

ABI and TNC Regional Ecologists, Midwestern Region.

References

- Frolick, A. L., and F. D. Keim. 1933. Native vegetation in the prairie hay district of north central Nebraska. *Ecology* 14:298-305.
- Pool, R. J. 1914. A study of the vegetation of the sandhills of Nebraska. *Minnesota Botanical Studies* 4:189-312.
- Tolstead, W. L. 1942. Vegetation of the northern part of Cherry County, Nebraska. *Ecological Monographs* 12(3):257-292.

Scientific Name: *Spartina pectinata* - *Calamagrostis stricta* - *Carex* spp. Herbaceous Vegetation

Translated Scientific Name: Prairie Cordgrass - Western Bluejoint - Sedge species Herbaceous Vegetation

Common Name: Northern Cordgrass Wet Prairie

Unique Identifier: CEG002027

Classification Code: V.A.5.N.j.11

Association Classification Confidence Level: Moderate

Association Summary: This prairie cordgrass wet prairie community occurs in the northern tallgrass prairie region of the United States and Canada. Stands occur in many shallow pond basins and lakes, as well as on terraces and floodplains of streams and rivers. The soils are deep, typically poorly drained, with clay or silty loam upper horizons that have a characteristic gley layer. The community is subject to seasonal inundation. The vegetation is dominated by fine-textured grasses, low sedges, and rushes, with a mixture of forbs. The most common species are *Aster lanceolatus* var. *lanceolatus*, *Boltonia asteroides* var. *latisquama*, *Calamagrostis canadensis*, *Carex lanuginosa*, *Carex praegracilis*, *Carex sartwellii*, *Carex stricta*, *Poa palustris*, and *Spartina pectinata*. Other species that are often present are *Apocynum cannabinum*, *Juncus balticus*, *Liatris pycnostachya*, *Sonchus arvensis*, *Stachys palustris*, and *Teucrium canadense*.

Ecological System

Terrestrial

Formation Class

V - Herbaceous Vegetation

Formation Subclass

V.A - Perennial graminoid vegetation

Formation Name

V.A.5.N.j - Temporarily flooded temperate or subpolar grassland

Alliance Name

V.A.5.N.j.11 - SPARTINA PECTINATA TEMPORARILY FLOODED HERBACEOUS ALLIANCE

Global Heritage Status Rank Summary

Global Heritage Status Rank: G3?

Global Heritage Status Rank Reasons: Many sites of this community have been drained and/or plowed and converted to cropland.

Distribution

Nation: United States

United States Distribution: IA, MN, ND, NE, SD

Nation: Canada

Canadian Province Distribution: MB

Global Range Comments: This prairie cordgrass wet prairie community occurs in the northern tallgrass prairie region of the United States and Canada, ranging from northern Nebraska to southern Manitoba.

Authors/Contributors

Element Description Author(s): J. Drake, D. Faber-Langendoen, and D. Ambrose, mod. D. Faber-Langendoen

ABI and TNC Regional Ecologists, Midwestern Region.

References

- Barnes, P. W., and L. L. Tieszen. 1978. A phytosociological study of 14 selected communities at the Samuel H. Ordway Prairie. Unpublished Paper. Undergraduate Research Project, Augustana College, Sioux Falls, SD.
- Brotherson, J. D. 1969. Species composition, distribution, and phytosociology of Kaslow Prairie, a mesic tallgrass prairie in Iowa. Unpublished Ph.D. dissertation. Iowa State University, Ames. 196 pp.
- Minnesota Natural Heritage Program. 1993. *Minnesota's native vegetation: A key to natural communities*. Version 1.5. Minnesota Department of Natural Resources, Natural Heritage Program, St. Paul, MN. 110 pp.
- Redmann, R. E. 1972. Plant communities and soils of an eastern North Dakota prairie. *Bulletin of the Torrey Botanical Club* 99(2):65-76.
- Steinauer, G., and S. Rolfsmeier. 1997. *Terrestrial natural communities of Nebraska*. Draft - October 28, 1997. Nebraska Game and Parks Commission, Lincoln, NE. 117 pp.
- Tatina, R. 1987. Gradient analysis and description of a transition zone prairie in eastern South Dakota. *Proceedings of the South Dakota Academy of Science* 66:51-64.
- Weaver, J. E. 1960. Flood plain vegetation of the central Missouri Valley and contacts of woodland with prairie. *Ecological Monographs* 30:37-64.

Scientific Name: Typha spp. - Scirpus spp. - Mixed Herbs Great Plains Herbaceous Vegetation

Translated Scientific Name: Cattail species - Bulrush species - Mixed Herbs Great Plains Herbaceous Vegetation

Common Name: Northern Great Plains Cattail - Bulrush Marsh

Unique Identifier: CEG002228

Classification Code: V.A.5.N.1.9

Association Classification Confidence Level: Moderate

Association Summary: This community ranges broadly over the northern Great Plains of the United States. It is found in basin-like depressions, backwater areas of floodplains and margins of lakes or ponds where depths range from less than 15 cm to greater than 1 m over most or all of the growing season. Vegetation varies from zones dominated by tall emergents 1-2 m tall to those with floating or submerged aquatics in the deeper margins to perennial forbs <1 m tall in the shallower margins. In the tall emergent zone, Scirpus spp. (Scirpus tabernaemontani, Scirpus fluviatilis, Scirpus acutus) and Typha spp. (Typha angustifolia, Typha latifolia) may dominate, mixed with a variety of other herbaceous species, such as Leersia oryzoides, Eleocharis palustris, Juncus spp. and Sparganium spp. in the shallower parts of the marsh. Floating-leaved and submerged aquatics are sometimes present, including Azolla caroliniana, Lemna spp., Spirodela polyrrhiza, and Potamogeton spp.

Ecological System

Terrestrial

Formation Class

V - Herbaceous Vegetation

Formation Subclass

V.A - Perennial graminoid vegetation

Formation Name

V.A.5.N.1 - Semipermanently flooded temperate or subpolar grassland

Alliance Name

V.A.5.N.1.9 - TYPHA (ANGUSTIFOLIA, LATIFOLIA) - (SCIRPUS SPP.)

SEMIPERMANENTLY FLOODED

HERBACEOUS ALLIANCE

Global Heritage Status Rank Summary

Global Heritage Status Rank: G4G5

Global Heritage Status Rank Reasons: Although occurring in very small patches in the Great Plains, this relatively simple floristic association may be very widespread.

Distribution

Nation: United States

United States Distribution: ND, NE, SD

Nation: Canada

Canadian Province Distribution: MB

Global Range Comments: This community ranges broadly over the northern Great Plains of the United States, and into adjacent Canada, from Nebraska to Manitoba.

Authors/Contributors

Global Ranking Factors Edition Date: 28Sep1999

Global Ranking Factors Author: D. Faber-Langendoen

Element Description Author(s): D. Faber-Langendoen

ABI and TNC Regional Ecologists, Midwestern Region.

References

Steinauer, G., and S. Rolfsmeier. 1997. Terrestrial natural communities of Nebraska. Draft - October 28, 1997. Nebraska Game and Parks Commission, Lincoln, NE. 117 pp.