

# USGS-NPS VEGETATION MAPPING PROGRAM

## Vegetation Classification of Tuzigoot National Monument

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## VEGETATION SAMPLING AND CLASSIFICATION

### Introduction

This report presents the results of the vegetation classification portion of the NPS/USGS Vegetation Mapping Program at Tuzigoot National Monument (TNM), Arizona. The methods for sampling vegetation are discussed in reference to the standard procedures in *Field Methods for Vegetation Mapping* (The Nature Conservancy 1994). This report includes the vegetation classification for TNM, a field key to the vegetation types on TNM, and descriptions of each vegetation type. The field data sheets with information gathered from TNM and the electronic data files are provided as supplements.

### Methods

The methods used for developing the vegetation classification for TNM followed the standards described in *Field Methods for Vegetation Mapping*. The small size of the Monument permitted sampling of the entire area.

The sampling strategy included three stages: 1) reconnaissance, 2) aerial photography interpretation, and 3) plot location. First, a reconnaissance of TNM was conducted to characterize the vegetation across important environmental gradients and to identify its relationship to previous vegetation classifications. The gradients recognized were moisture, topography, and site disturbance. During the reconnaissance, twenty preliminary vegetation types, based on plant species dominance and composition, were recognized. The initial list of types included four vegetation types identified in the 1995 Western Regional Vegetation Classification.

The second stage of the sampling strategy was to delineate polygons of relatively homogeneous vegetation within the project area by examining infrared aerial photographs. Preliminary vegetation types were coarsely delineated by photo interpretation of canopy cover and vegetative structure. Thirty-five homogenous vegetation polygons were recognized after inspecting the aerial photographs.

The final stage of the sampling strategy was to locate plots within the thirty-five polygons that encompassed the range of vegetation types on the Monument. Plots were subjectively located to represent the variation of the vegetation within the polygon.

All vegetative cover descriptions at Tuzigoot National Monument were developed using data collected from square and rectangular plots. Plots varied in size from 5m x 20m, for primarily herbaceous vegetation, to as large as 20m x 20m, for primarily arborescent and shrubby woodland vegetation. Each plot was placed to encompass the variability of vegetation in the polygon and to contain the typical and representative vegetation for the sample unit.

### Results

Inspection of plot data, discussions with experts, and review of literature describing Arizona vegetation resulted in the definition of twenty-two vegetation types. This classification included five woodland types, eight shrubland types, and nine herbaceous types. Of those, three are recognized types within the existing vegetation classification of the western U.S. (Bourgeron and Engelking 1994). They include *Populus fremontii*-*Salix Gooddingii* Woodland, *Juniperus erythrocarpa*-*Canotia holocantha* Woodland, and *Prosopis velutina*/*Celtis reticulata* Shrubland. The remaining sixteen apparently are new to science.

Some vegetation types on the Monument had relatively uniform floristic patterns but differed in their structure. For example, a type with relatively similar understory composition could have a shrub layer on some areas of the Monument and be lacking the shrub layer in other areas. If these floristically similar but structurally different vegetation types occurred in similar environments, they were considered to be developmental stages of the same vegetation type and were therefore classified as a single type.

Many of the vegetation types recognized on TNM were highly disturbed, due to past human influence (see Discussion section). This disturbance caused some difficulty in placing the existing vegetation types on the Monument within the National Vegetation Classification System. Disturbed vegetation types, either dominated by exotic species or the result of obvious site alteration, were classified as the most closely related previously described natural, native vegetation whenever possible. When it was impossible to recognize the most closely related natural, native vegetation, a new vegetation type was defined.

Altered hydrologic regimes created the greatest difficulty to vegetation classification because residual species from a previous hydrologic regime were mixed with indicators of other site conditions. When this species mixing was extensive and the resulting vegetation was judged to be long-lived, these vegetation types were recognized as new, transitional types whose relationship to other similar vegetation types in the classification is unclear. For example the *Populus fremontii/Prosopis velutina* Woodland (Cottonwood/Mesquite Woodland) type at TNM has a cottonwood component that reflects history of flooding and a mesquite component that represents more upland situations. This vegetation was recognized as a new type to the classification rather than lumping it with previously defined Cottonwood types or Mesquite types.

If the transitional vegetation was ephemeral (with boundaries that can change from year to year) but had clearer floristic or hydrologic affinities with other recognized vegetation types, the type was lumped with the most closely related type in the classification. For example, the *Typha angustifolia* marsh (narrowleaf cattail marsh) at TNM contains homogenous patches dominated by *Typha angustifolia*, *Scirpus validus* and *Eleocharis parishii*, respectively. Due to the extreme temporal variability of this vegetation (a given area of the marsh dominated by *Typha angustifolia* one year can be dominated by *Scirpus validus* or *Eleocharis parishii* the next), these vegetation units were lumped and recognized as a single type in the classification.

The classification of vegetation on Tuzigoot National Monument within the National Vegetation Classification System hierarchy follows. Only pertinent levels of that system are listed. A vegetation key, using plant species presence and abundance measures to facilitate identification of the vegetation types, appears in the next section. Descriptions of each type to support the classification complete this report.

## Classification

"\*" indicates a new Formation in the National Vegetation Classification System.

- II. WOODLAND. Open stands of trees over 5 meters tall with crowns usually not touching (generally 25-60% cover)
  - II.A. Evergreen woodland (evergreen species generally contribute >75% of the total tree cover)
    - II.A.4. Temperate or subpolar needle-leaved evergreen woodland
      - II.A.4.N.a. Rounded-crowned temperate or subpolar needle-leaved evergreen woodland  
  
JUNIPERUS ERYTHROCARPA WOODLAND ALLIANCE  
***Juniperus erythrocarpa*—*Canotia holocantha* Woodland**
  - II.B. Deciduous woodland (evergreen species generally contribute >75% of the total tree cover)
    - II.B.2. Cold-deciduous woodland
      - II.B.2.N.b. Seasonally/temporarily flooded cold-deciduous woodland  
  
POPULUS FREMONTII WOODLAND ALLIANCE  
***Populus fremontii*—*Salix gooddingii* Woodland**
      - \*II.B.2.N.g. Intermittently flooded cold-deciduous woodland  
  
POPULUS FREMONTII (RIPARIAN) WOODLAND ALLIANCE  
***Populus fremontii*/*Hordeum jubatum* Woodland**  
  
***Populus fremontii*/*Prosopis velutina* Woodland**
  - II.C. Mixed evergreen-deciduous woodland (evergreen and deciduous species generally contribute 25-75% of the total tree cover)
    - II.C.2. Mixed broad-leaved evergreen—cold-deciduous woodland
      - II.C.2.N.a. Mixed broadleaf evergreen—cold-deciduous woodland  
  
CELTIS RETICULATA WOODLAND ALLIANCE  
***Celtis reticulata*—*Quercus turbinella* Woodland**

III. SHRUBLAND (SCRUB). Shrubs generally greater than 0.5 m tall with individuals or clumps not touching to interlocking (generally forming >25% canopy cover, - tree cover <25%) Shrub cover may be less than 25% in cases when the cover of each of the other lifeforms present is less than 25% and shrub cover exceeds the cover of other lifeforms.

III.A. Evergreen shrubland (scrub) (evergreen species generally contribute >75% of the total shrub cover)

III.A.5. Extremely xeromorphic evergreen shrubland

III.A.5.N.a. Evergreen extremely xeromorphic subdesert shrubland

CANOTIA HOLOCANTHA SHRUBLAND ALLIANCE  
***Canotia holocantha/Aristida purpurea* Shrubland**

LARREA TRIDENTATA SHRUBLAND ALLIANCE  
***Larrea tridentata/Aristida purpurea* Shrubland**

III.A.5.N.b. Facultatively deciduous extremely xeromorphic subdesert shrubland

ATRIPLEX CANESCENS SHRUBLAND ALLIANCE  
***Atriplex canescens/Muhlenbergia porteri* Shrubland**

III.B. Deciduous shrubland (deciduous species generally contribute >75% of the total shrub cover)

III.B.2. Cold-deciduous shrubland

\*III.B.2.N.f. Intermittently flooded cold-deciduous shrubland

CHILOPSIS LINEARIS SHRUBLAND ALLIANCE  
***Chilopsis linearis* Shrubland Alliance**

III.B.3. Extremely xeromorphic deciduous shrubland

III.B.3.N.a. Extremely xeromorphic deciduous shrubland without succulents

PROSOPIS VELUTINA SHRUBLAND ALLIANCE  
***Prosopis velutina/Celtis reticulata* Shrubland**

***Prosopis velutina/Gutierrezia sarthorae* Shrubland**

***Prosopis velutina/Hordeum jubatum* Shrubland**

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- V. HERBACEOUS Herbs (graminoids, forbs and ferns) dominant (generally forming at least 25% cover). Trees, shrubs and dwarf-shrubs generally with less than 25% cover.
  - V.A. Perennial graminoid. Perennial graminoids (grasses) generally contribute to >50% of total herbaceous cover.
    - V.A.5. Temperate or subpolar grassland
      - V.A.5.N.d. Medium-tall bunch temperate or subpolar grassland  
  
ERAGROSTIS LEHMANNIANA HERBACEOUS ALLIANCE  
***Eragrostis lehmanniana* Herbaceous Alliance**
      - V.A.5.N.i. Intermittently flooded temperate grassland  
  
MUHLENBERGIA ASPERIFOLIA HERBACEOUS ALLIANCE  
***Muhlenbergia asperifolia*—*Eleocharis parshii* Herbaceous Vegetation**
      - V.A.5.N.l. Seasonally flooded/temporarily flooded temperate grassland  
  
TYPHA ANGUSTIFOLIA HERBACEOUS ALLIANCE  
***Typha angustifolia* Herbaceous Alliance**
      - V.A.5.C. Planted/Cultivated temperate or subpolar grassland
    - V.B. Perennial forb vegetation
      - V.B.2. Temperate or subpolar annual perennial forb vegetation
        - V.B.2.N. Natural/seminatural temperate or subpolar perennial forb vegetation
        - V.B.2.C. Cultivated/semicultivated temperate or subpolar perennial forb vegetation

V.D. Annual graminoids or forbs

V.D.2. Temperate or subpolar annual grassland or forb vegetation

V.D.2.N.e. Low temperate intermittently exposed annual forb vegetation

## **Discussion**

TNM and vicinity has a long history of human-derived influences to vegetation. Pre-Columbian people occupied this section of the Verde River Valley for centuries and engaged in agriculture and alteration of flooding patterns. Post-Columbian civilization has had dramatic impacts on vegetation pattern and natural processes affecting their development. Notable alteration has included: 1) deposition of mine, alteration of hydrologic regimes and patterns, and direct manipulation of vegetation through planting and cropping in the flood plain; 2) introduction of livestock; and 3) possible alteration of fire frequencies.

These combined factors have led to a vegetation pattern that is reflected in a confusion of species distributions that indicate past establishment patterns and current growing conditions. For example, the effect of construction of a weir dam has created an environment for and is currently expanding the distribution of marshlands. The marsh on TNM includes the recognizable vegetation type, narrowleaf cattail marsh, and a plethora of vegetation units that combine marsh species with upland (non-wetland obligates) and cultivated plants. These types of disturbance regimes make it difficult to place the vegetation of TNM into a wider geographic context.

In addition, very few vegetation classifications based on floristic and physiognomic characteristics are available for the region of Arizona containing TNM. Consequently, many of TNM's vegetation types cannot be compared to any previous vegetation study. This paucity of information in conjunction with the extensive disturbance history of TNM and surrounding areas makes interpretation and classification of its vegetation tenuous. An expanded reconnaissance and inventory of surrounding vegetation is needed for better evaluation and classification of the vegetation. Sampling beyond the confines of the project area is, therefore, necessary to verify this classification and associated conservation ranks.

## **General References**

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## FIELD KEY TO THE PLANT COMMUNITIES OF TUZIGOOT NATIONAL MONUMENT

1. *Populus fremontii* >25% cover
  2. *Salix gooddingii* >5% cover.....***Populus fremontii*—*Salix gooddingii* Woodland**
  2. *Salix gooddingii* <5% cover
    3. *Hordeum jubatum* >50% cover.....***Populus fremontii*/*Hordeum jubatum* Woodland**
    3. *Hordeum jubatum* <50% cover and *Prosopis velutina* or *Mahonia trifoliata* >5% cover  
.....***Populus fremontii*/*Prosopis velutina* Woodland**
1. *Populus fremontii* <25% cover
  4. *Canotia holocantha* >5% cover
    5. *Juniperus erythrocarpa* >5% cover & >2 m tall  
.....***Juniperus erythrocarpa*—*Canotia holocantha* Woodland**
    5. *Juniperus erythrocarpa* <5% cover
      6. *Celtis reticulata* and *Quercus turbinella* >25% cover  
.....***Celtis reticulata*—*Quercus turbinella* Woodland**
      6. *Celtis reticulata* and *Quercus turbinella* <5% and *Aristida purpurea* >1% cover  
.....***Canotia holocantha*/*Aristida purpurea* Woodland**
  4. *Canotia holocantha* <5% cover
    7. *Larrea tridentata* >5% cover  
.....***Larrea tridentata*/*Aristida purpurea* Shrubland**
    7. *Larrea tridentata* <5%
      8. *Atriplex canescens* >5% cover and *Muhlenbergia porteri* present  
.....***Atriplex canescens*/*Muhlenbergia porteri* Shrubland**
      8. *Atriplex canescens* <5% cover and *Muhlenbergia porteri* absent
        9. *Chilopsis linearis* >25% cover.....***Chilopsis linearis* Alliance**
        9. *Chilopsis linearis* absent

10. *Prosopis velutina* >5% cover

11. *Celtis reticulata* >25% cover &/or *Mahonia trifoliata* >5% cover and/or *Ziziphus obtusifolia* >1% cover  
.....***Prosopis velutina*/Celtis reticulata Shrubland**

11. *Celtis reticulata*, *Mahonia trifoliata* and/or *Ziziphus obtusifolia* <5% cover

12. *Hordeum jubatum* >50% cover  
.....***Prosopis velutina*/Hordeum jubatum Shrubland**

12. *Hordeum jubatum* <50% cover

13. *Distichlis stricta* >5% cover & *Kochia scoparia* & *Aster tephordes* present.....***Prosopis velutina* / Distichlis stricta Herbaceous Vegetation**

13. *Distichlis stricta* <5% cover & *Kochia scoparia* & *Aster tephordes* absent

14. *Gutierrezia sarthorae* >5% cover  
.....***Prosopis velutina* / Gutierrezia sarthorae Shrubland**

14. *Typha* spp or *Scirpus* spp >25% cover  
....***Typha angustifolia* Herbaceous Alliance**

20. *Salsola kali* >25% cover, *Baccharis sergiloides* common  
.....**Intermittently flooded cold-deciduous Shrubland Formation**

10. *Prosopis velutina* <5% cover

15. *Distichlis stricta* >5% cover & *Kochia scoparia* & *Aster tephordes* present.....***Prosopis velutina* / Distichlis stricta Herbaceous Vegetation**

15. *Distichlis stricta* <5% cover & *Kochia scoparia* & *Aster tephordes* absent

16. *Typha* spp or *Scirpus* spp >25% cover  
.....***Typha angustifolia* Herbaceous Alliance**

16. *Typha* spp or *Scirpus* spp <25% cover

17. *Muhlenbergia asperifolia* >25% cover  
....***Muhlenbergia asperifolia*—*Eleocharis parshii***  
**Herbaceous vegetation**
17. *Muhlenbergia asperifolia* <25% cover
18. *Cynodon dactylon* >25% cover  
.....***Cynodon dactylon* Herbaceous Alliance**
18. *Cynodon dactylon* <25%
19. *Eragrostis lehmanniana* >5% cover  
.....***Eragrostis lehmanniana***  
**Herbacouse Alliance**
19. *Eragrostis lehmanniana* <5% cover
20. *Aristida purpurea* >25% and  
*Krameria parviflora* >5% cover  
.....***Aristida purpurea* —  
*Krameria parvifolia***  
**Herbaceous Vegetation**
21. Only an annual mint  
(Labiatae Family) species  
present along the Verde  
River, *Salsola kali* absent  
.....**Low temperate  
intermittently exposed  
annual forb vegetation**
21. *Salsola kali* >25% cover
22. Few if any native  
plants present.  
.....**Semi-cultivated  
temperate or  
subpolar perennial  
forb vegetation**
22. Native plants present.  
.....**Semi-natural  
temperate or  
subpolar perennial  
forb vegetation**

## VEGETATION DESCRIPTION FOR TUZIGOOT NATIONAL MONUMENT

NOTE: "\*" Indicates a new formation to the National Vegetation Classification System

### Populus fremontii — Salix gooddingii Woodland

COMMON NAME	Fremont's cottonwood—Goodding's willow Woodland
SYNONYM	1224.531 in Reichenbacher, 1983.
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Deciduous woodland
PHYSIOGNOMIC GROUP	Cold-deciduous woodland
FORMATION	Seasonally/temporarily flooded cold-deciduous woodland
ALLIANCE	<i>Populus fremontii</i> Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 2

#### RANGE

This community is found in the Trans-Pecos region of west Texas, in southern New Mexico, and southern Arizona. Specifically it occurs along many streams in central and southern Arizona. It may occur in adjacent California, and Mexico.

#### *Tuzigoot National Monument*

This association forms a ribbon along the southern edge of the main channel of the Verde River.

#### ENVIRONMENTAL DESCRIPTION

This deciduous woodland is best developed along alluvial floodplains of large, low-gradient, perennial streams that flow through wide, unconstrained valleys. The vegetation is dependant on a subsurface water supply and varies considerably with the height of the water table. Major flood events and consequent flood scour, overbank deposition of water and sediments, and stream meandering are important factors that shape this community. Soils are typically stratified sands, loams, and gravels classified as Torrifluvents or Ustifluvents, with Haplustolls on more stable sites. These coarse textured, alluvial sediments have a low water-holding capacity and low nutrient availability. In well developed floodplains, streambanks support stands representative of this association. Alluvial soils composed of sand and gravel typify these sites. Flooding is essential for the regeneration and maintenance of these communities in a river system.

#### *Tuzigoot National Monument*

This association is located on seasonally to intermittently flooded, fine sandy soils scattered with driftwood and litter carried by high water.

USFWS WETLAND SYSTEM Palustrine

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### Tuzigoot National Monument

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#### MOST ABUNDANT SPECIES

##### *Globally*

##### Strata

Tree canopy

##### Species

*Populus fremontii*, *Salix gooddingii*, *Platanus wrightii*, *Fraxinus pennsylvanica*, *Juglans major*, *Morus microphylla*, *Salix bonplandiana*

Shrub

*Ziziphus obtusifolia*, *Hyemnoclea mongyra*, *Lycium* spp., *Baccharis salicifolia*, *Baccharis sarothroides*

Herbaceous

*Brickellia* spp.

##### *Tuzigoot National Monument*

##### Strata

Tree canopy

##### Species

*Populus fremontii*, *Salix gooddingii*, *Tamarix chinensis*

Shrub

*Prosopis velutina*

Herbaceous

*Brickellia* spp., *Euphorbia* spp., *Cynodon dactylon*, *Sporobolus cryptandrus*

#### DIAGNOSTIC SPECIES

##### *Globally*

*Populus fremontii*, *Salix gooddingii*

##### *Tuzigoot National Monument*

*Populus fremontii*, *Salix gooddingii*

#### VEGETATION DESCRIPTION

##### *Globally*

This community occurs as small isolated stands or as linear bands that parallel the stream channel. It typically towers above the surrounding vegetation. This broadleaf woodland, dominated by *Populus fremontii* trees 30 meters tall, typically appears over a more visually prominent lower tree layer of *Salix gooddingii* and other shorter trees. The understory is generally a thicket of shrubs, although their density varies with developmental stage of the community and disturbance regime. The understory of most examples has been considerably altered by grazing and other factors; thus, the composition and cover of the native understory is difficult to ascertain. The understory can be dense to open and frequently consists of shrubs and small trees 1m — 5m tall. The woody exotics *Elaeagnus angustifolia* and various species of *Tamarix* now dominate the understory of most examples. The herbaceous stratum varies in composition and coverage but is characterized by mixed annuals and short-lived perennials. Most examples now have a herbaceous flora dominated by exotic species, in particular *Cynodon dactylon*.

##### *Tuzigoot National Monument*

The *Populus fremontii*—*Salix gooddingii* association is bordered on the north by the Verde River. An unknown mint was prominent on the infrared aerial photographs along the water margin. *Platanus racemosa* and *Fraxinus velutina* saplings were observed in the stand sampled. The understory of the *Populus fremontii*—*Salix gooddingii* association is clear of herbaceous species, probably due to scouring of the bank by the river.

#### OTHER NOTEWORTHY SPECIES

Exotic plant species found in this community include *Tamarix chinensis*, *Elaeagnus angustifolia*, *Cynodon dactylon*, *Bromus rubens*, *Hordeum murinum* ssp. *leporinum*, *Pennisetum setaceum*, *Schismus* spp., *Sisymbrium irio*, and *Erodium* spp.

#### CONSERVATION RANK G2

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**Tuzigoot National Monument**

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**RANK JUSTIFICATION**

This woodland once occupied the floodplains and riverbanks of most perennial waterways within its range, but has mostly been replaced by disturbance types dominated by exotic species. Major impacts to this community are the overuse by domestic livestock and reservoir and irrigation projects. Dams and water diversions on perennial streams have severely reduced stream flow and altered the natural flooding processes of these riparian communities.

**COMMENTS**

To the south, east and west on the Monument, the *Populus fremontii*—*Salix gooddingii* association is bordered by the *Chilopsis linearis* association. Irrigation ditches lined by a luxuriant stand of *Prosopis velutina*, *Celtis reticulata*, *Fraxinus velutina*, *Datura meteloides*, *Cucurbita digita*, and *Vitis Arizonica* border this community.

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## Populus fremontii / Hordeum jubatum Woodland

COMMON NAME	Fremont's Cottonwood/Foxtail barley Woodland
SYNONYM	1224.5302 in Reichenbacher, 1983.
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Deciduous woodland
PHYSIOGNOMIC GROUP	Cold-deciduous woodland
FORMATION	Intermittently flooded cold-deciduous woodland*
ALLIANCE	<i>Populus fremontii</i> (Riparian) Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed type and distribution unknown.

#### *Tuzigoot National Monument*

This association appears adjacent to the Verde River.

### ENVIRONMENTAL DESCRIPTION

#### *Tuzigoot National Monument*

This association appears on deep, well-drained, sandy soils along the Verde River.

USFWS WETLAND SYSTEM Palustrine

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

<u>Strata</u>	<u>Species</u>
Tree canopy	<i>Populus fremontii</i>
Shrub	<i>Prosopis velutina</i> , <i>Ziziphus obtusifolia</i> , <i>Kochia scoparia</i>
Herbaceous	<i>Solanum douglassii</i> , <i>Datura meteloides</i> , <i>Amaranthus powellii</i> , <i>Salsola kali</i> , <i>Capsella</i> spp., <i>Hordeum jubatum</i> , <i>Funastrum cyanchoides</i>

### DIAGNOSTIC SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

*Populus fremontii*, *Hordeum jubatum* >50% cover, *Solanum douglassii*, *Funastrum cyanchoides*

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VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

The understory is well shaded by several large *Populus fremontii* trees. *Hordeum jubatum* nearly completely covers the ground, except where pocket gopher mounds have recently exposed mineral soil. Few other herbaceous species occur in the community. Where the trees are widely spaced, a tall forb layer often appears above a less dense ground cover of *Hordeum jubatum*. Shrub species common in the *Populus fremontii/Prosopis velutina* association are present, but they are small and widely scattered. Abundant leaf litter is a common feature in the understory.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G?

RANK JUSTIFICATION Not applicable

COMMENTS

This may be a disturbance variant of the *Populus fremontii*—*Salix gooddingii* association or a structural variant of the *Populus fremontii/Prosopis velutina* association with which it shares many species. These communities apparently differ in hydrologic regime and disturbance history. Either of these processes may contribute to maintaining the different community types.

REFERENCES

Reichenbacher, F.W. 1983. Plant Communities of Arizona. Report to Arizona Natural Heritage Program. Tucson, AZ.

## Populus fremontii / Prosopis velutina Woodland

COMMON NAME	Fremont cottonwood/Velvet mesquite Woodland
SYNONYM	1224.5302 in Reichenbacher, 1983.
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Deciduous woodland
PHYSIOGNOMIC GROUP	Cold-deciduous woodland
FORMATION	Intermittently flooded cold-deciduous woodland *
ALLIANCE	<i>Populus fremontii</i> (Riparian) Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed type and distribution unknown.

### *Tuzigoot National Monument*

This association is found at the north end of the study area, to the south of the old dairy pasture, and at the toe slopes near the surface, partially covered with mine tailings.

### ENVIRONMENTAL DESCRIPTION

#### *Tuzigoot National Monument*

This association is found on toe slopes where several incised arroyos come together. The soil texture is sandy, clay loam.

USFWS WETLAND SYSTEM Palustrine

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available

### *Tuzigoot National Monument*

#### Strata

Tree canopy

#### Species

*Prosopis velutina*, *Celtis reticulata*, *Populus fremontii*, *Elaeagnus angustifolia*

Shrub

*Forrestiera neomexicana*, *Mahonia trifoliata*, *Ziziphus obtusifolia*

Herbaceous

*Sphaeralcea parvifolia*, *Salsola kali*, *Solanum douglassii*, *Hordeum jubatum*, *Bromus rubens*, *Capsella* spp.

### DIAGNOSTIC SPECIES

#### *Globally*

Information not available.

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**Tuzigoot National Monument**

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*Tuzigoot National Monument*

*Populus fremontii*, *Mahonia trifoliata*, *Celtis reticulata*, *Prosopis velutina*

VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

This association is very dense and is almost impossible to pass through in many areas. *Populus fremontii* trees form an open canopy above a shrub thicket. *Prosopis velutina* and *Mahonia trifoliata* are the most common shrubs. The herbaceous layer is relatively well-developed, although dominated by weedy species, i.e. *Hordeum jubatum*, *Bromus rubens*, and *Solanum douglasii*.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G?

RANK JUSTIFICATION Not applicable

COMMENTS

This association may be a developmental stage or disturbance variant of the *Populus fremontii*—*Salix gooddingii* association. Hydrologic regime is unclear, and its classification may solely reflect the presence of *Populus fremontii*, a residual palustrine indicator.

On the Monument, to the south and east (out of the floodplain), this community intergrades with the *Prosopis velutina/Gutierrezia sarothrae* or the *Prosopis velutina/Celtis laevigata* var. *reticulata* associations. To the north, it intergrades into the abandoned pasture. There is only one location of this vegetation association at Tuzigoot National Monument.

REFERENCES

Reichenbacher, F.W. 1983. Plant Communities of Arizona. Report to Arizona Natural Heritage Program. Tucson, AZ.

## Juniperus erythrocarpa / Canotia holocantha Woodland

COMMON NAME	Redberry juniper—Canotia Woodland
SYNONYM	1122.41 in Reichenbacher, 1983; <i>Juniperus monosperma</i>
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Evergreen woodland
PHYSIOGNOMIC GROUP	Temperate or subpolar needle-leaved woodland
FORMATION	Rounded-crowned temperate or subpolar needle-leaved woodland
ALLIANCE	<i>Juniperus erythrocarpa</i> Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Central Arizona.

#### *Tuzigoot National Monument*

This association occupies the mesa tops that surround the Monument. It also occurs on the limestone bluffs on the east and north of the Monument.

### ENVIRONMENTAL DESCRIPTION

This association appears on dissected elevated plains, eroding plains of valley fill alluvia, and on steep erosional hills. Soils display a thermic temperature regime.

#### *Tuzigoot National Monument*

The *Juniperus erythrocarpa/Canotia holocantha* association occurs on the midslopes of the limestone bluffs, on shallow, rapidly-drained, sandy loam drainage ways. This association is found on rapidly-drained, steep (58 degrees) limestone bluffs that receive full sun.

USFWS WETLAND SYSTEM Not applicable

### MOST ABUNDANT SPECIES

#### *Globally*

##### Strata

Tree canopy

Shrub

Herbaceous

##### Species

*Juniperus erythrocarpa*, *Juniperus osteosperma*

*Canotia holocantha*, *Quercus turbinella*, *Nolina microcarpa*, *Berberis haematocarpa*, *Berberis fremontii*, *Prosopis velutina*, *Yucca baccata*, *Yucca elata*, *Gutierrezia sarothrae*

*Aristida* spp., *Bouteloua curtipendula*, *Bouteloua eriopoda*, *Schizachyrium scoparium*, *Hilaria belangerii*, *Muhlenbergia porteri*

## USGS-NPS Vegetation Mapping Program

### Tuzigoot National Monument

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#### *Tuzigoot National Monument*

<u>Strata</u>	<u>Species</u>
Tree canopy	<i>Juniperus erythrocarpa</i>
Shrub	<i>Canotia holocantha</i> , <i>Acacia greggii</i> , <i>Mahonia trifoliata</i> , <i>Gutierrezia sarothrae</i> , <i>Yucca elata</i> , <i>Krameria parvifolia</i> , <i>Ziziphus obtusifolia</i> , <i>Prosopis velutina</i> , <i>Celtis pallida</i> , <i>Ephedra viridis</i> , <i>Parthenium incanum</i> , <i>Eurotia lanata</i>
Herbaceous	<i>Aristida purpurea</i> , <i>Bouteloua curtipendula</i> , <i>Sphaeralcea</i> spp., <i>Bromus rubens</i>

#### DIAGNOSTIC SPECIES

##### *Globally*

*Juniperus erythrocarpa*, *Canotia holocantha*

##### *Tuzigoot National Monument*

*Juniperus erythrocarpa*, *Canotia holocantha*

#### VEGETATION DESCRIPTION

##### *Globally*

Information is not available.

##### *Tuzigoot National Monument*

The *Juniperus erythrocarpa/Canotia holocantha* association occupies slopes and portions of the mesa top. It is an open woodland with total tree cover of 25-50% composed only of short *Juniperus erythrocarpa* trees. *Canotia holocantha* dominates the shrub layer, both in cover and in height. Shorter shrubs are a common component of this association, but are rarely found in high abundance. The herbaceous layer of this community is very open and depauperate. Plot data yields only three herbaceous species with total cover <10%. *Aristida purpurea* and *Bouteloua curtipendula* are common grasses and indicate an affinity of this community with semidesert grasslands.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G3

#### RANK JUSTIFICATION

This association is restricted geographically to central Arizona. It has been subjected to many land uses that have altered natural processes.

#### COMMENTS

On the adjacent mesa tops, this association is bordered by the *Larrea tridentata/ Aristida purpurea* association. It borders the bottomland and toe slope associations dominated by *Prosopis velutina*. The surrounding slopes are occupied by the *Canotia holocantha/Aristida purpurea* association, which is very closely affiliated with the *Juniperis erythrocarpa—Canotia holocantha* association. These two associations may be a complex of communities that are structural stages of a single community type or of two different types than distinguished here. Detailed vegetation studies on the influence of both livestock grazing and fire are needed to decipher the ecological relationships among species and community dynamics. Although fire in desert grasslands is under more local control than in mesic grasslands, alteration of natural fire frequencies, direct fire suppression efforts, or reduction of fuel through grazing, has lead to woody invasion into grasslands throughout the southwest (Archer, S. 1994).

**USGS-NPS Vegetation Mapping Program**  
**Tuzigoot National Monument**

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REFERENCES

Archer, S. 1994. Woody Plant Encroachment into Southwestern Grasslands and Savannas: Patterns and Proximate Causes. 13-68pp. IN: Vavra, Laycock and Pieper (EDS). Ecological Implications of Livestock Herbivory in the West. Society for Range Management. Denver, CO.

Bassett, D., M. Larson, and W. Moir. 1987. Forest and Woodland Habitat Types (Plant Associations) of Arizona South of the Mogollon Rim and Southwestern New Mexico. Edition 2. Southwestern Regional Office. Albuquerque, New Mexico.

Reichenbacher, F.W. 1983. Plant Communities of Arizona. Report to Arizona Natural Heritage Program. Tucson, AZ.

*Celtis laevigata* var. *reticulata* — *Quercus turbinella* Woodland

COMMON NAME	Desert hackberry—Shrub live oak Woodland
SYNONYM	<i>Celtis laevigata</i> var. <i>reticulata</i> — <i>Quercus turbinella</i>
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Woodland
PHYSIOGNOMIC SUBCLASS	Mixed evergreen—deciduous woodland
PHYSIOGNOMIC GROUP	Mixed broadleaf evergreen—cold-deciduous woodland
FORMATION	Mixed broadleaf evergreen—cold-deciduous woodland
ALLIANCE	<i>Celtis reticulata</i> Woodland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

RANGE

Undescribed type and distribution unknown.

*Tuzigoot National Monument*

The *Celtis reticulata*—*Quercus turbinella* association appears on southeast-facing limestone slopes in arroyo canyons surrounding the Monument.

ENVIRONMENTAL DESCRIPTION

*Tuzigoot National Monument*

This association occupies well-drained, clay loam soils derived from limestone and occurs on slopes generally over forty degrees. This association is often found on slopes that did not receive direct sun until the afternoon during sampling (October).

USFWS WETLAND SYSTEM Not applicable

MOST ABUNDANT SPECIES

*Globally*

Information not available.

*Tuzigoot National Monument*

Strata

Tree canopy

Shrub

Herbaceous

Species

*Celtis reticulata*, *Quercus turbinella*, *Prosopis velutina*

*Acacia greggii*, *Canotia holocantha*, *Parthenium incanum*, *Gutierrezia sarothroides*, *Rhus trilobata*

*Artemisia ludoviciana*

DIAGNOSTIC SPECIES

*Globally*

Information not available.

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**Tuzigoot National Monument**

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*Tuzigoot National Monument*  
*Celtis reticulata, Quercus turbinella*

VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

The *Celtis reticulata*—*Quercus turbinella* association forms dense thickets on shaded, steep slopes. The dominant short tree species are nearly equal in cover. This multi-layered community is relatively rich in shrub species and poor in herbaceous species. *Canotia holocantha* and *Parthenium incanum* are the most common associated shrubs. *Larrea tridentata* did not appear in the plot, but was present in the community.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G?

RANK JUSTIFICATION Not applicable

COMMENTS

Downslope, this association merges into one of the *Prosopis velutina* communities associated with arroyos and bottomlands. Above this association is the *Juniperus erythrocarpa*—*Canotia holocantha* association.

REFERENCES None

## Canotia holocantha / Aristida purpurea Shrubland

COMMON NAME	Canotia/Purple three-awned needlegrass Shrubland
SYNONYM	None
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Extremely xeromorphic shrubland
FORMATION	Extremely xeromorphic evergreen subdesert shrubland
ALLIANCE	<i>Canotia holocantha</i> Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed type and distribution unknown.

#### *Tuzigoot National Monument*

The *Canotia holocantha/Aristida purpurea* association appears on mesa tops and slopes with outcrops that surround the Monument.

### ENVIRONMENTAL DESCRIPTION

#### *Tuzigoot National Monument*

The *Canotia holocantha/Aristida purpurea* association is located on very steep, rapidly-drained, shallow, sandy loam slopes with limestone outcrops.

USFWS WETLAND SYSTEM Not applicable

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

##### Strata

Shrub

##### Species

*Canotia holocantha*, *Ephedra viridis*, *Eurotia lanata*, *Ziziphus obtusifolia*, *Gutierrezia sarothrae*, *Canotia holocantha*, *Mahonia trifoliata*, *Krameria parvifolia*

Herbaceous

*Aristida purpurea*, *Bouteloua curtipendula*, *Baileya multiradiata*, *Euphorbia* spp., *Dyssodia neomexicana*

### DIAGNOSTIC SPECIES

#### *Globally*

Information not available.

**USGS-NPS Vegetation Mapping Program**  
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*Tuzigoot National Monument*

*Canotia holocantha* >5% cover, *Aristida purpurea* >1% cover

VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

The *Canotia holocantha*/*Aristida purpurea* association is generally associated with very steep slopes. It is an open shrubland with total shrub cover less than 25%. *Canotia holocantha* dominates the shrub layer both in cover and in height. Two variants of the *Canotia holocantha*/*Aristida purpurea* association are seen on the Monument: a *Canotia holocantha*—*Mahonia trifoliata* and a *Canotia holocantha*—*Ephedra viridis* community. The herbaceous layer of this community is very open and depauperate. Plot data yield only five herbaceous species with total cover <10%. *Aristida purpurea* and *Bouteloua curtipendula* are common grasses, which indicate an affinity of this community for semi-desert grasslands.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G?

RANK JUSTIFICATION Not applicable

COMMENTS

This association may be a developmental stage or disturbance variant of the *Juniperus erythrocarpa*—*Canotia holocantha* association.

On the adjacent mesa tops at the Monument, this association is bordered by the *Larrea tridentata*/*Aristida purpurea* association. The surrounding slopes are occupied by the *Juniperus erythrocarpa*/*Canotia holocantha* association.

REFERENCES None

## Larrea tridentata var. tridentata / Aristida purpurea Shrubland

COMMON NAME	Creosote/Purple three-awned needlegrass Shrubland
SYNONYM	<i>Larrea divaricata</i> association
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Extremely xeromorphic evergreen shrubland
FORMATION	Extremely xeromorphic evergreen subdesert shrubland
ALLIANCE	<i>Larrea tridentata</i> Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed type and distribution unknown.

#### *Tuzigoot National Monument*

This association occurs primarily along the eastern edge of the survey area, although it appears in isolated patches in the western portions of the Monument.

### ENVIRONMENTAL DESCRIPTION

#### *Tuzigoot National Monument*

The *Larrea tridentata*/*Aristida purpurea* association occupies limestone bluffs on rapidly-drained, shallow, sandy, clay loam soils and occurs on steep, very shallow, rapidly-drained, fine, sandy soils derived from red sandstone. Most occurrences of this type are found with exposed limestone outcrops on the mesa top, which has the appearance of a flagstone sidewalk.

USFWS WETLAND SYSTEM Not applicable

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

##### Strata

Shrub

##### Species

*Larrea tridentata*, *Krameria parvifolia*, *Canotia holocantha*, *Atriplex canescens*, *Eurotia lanata*, *Prosopis velutina*, *Gutierrezia sarothrae*, *Yucca baccata*

Herbaceous

*Aristida purpurea*, *Dyssodia neomexicana*, *Bromus rubens*

### DIAGNOSTIC SPECIES

#### *Globally*

Information not available.

**USGS-NPS Vegetation Mapping Program**  
**Tuzigoot National Monument**

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*Tuzigoot National Monument*

*Larrea tridentata*, *Aristida purpurea* >1% cover

VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

This association is represented by very open shrub communities (total shrub cover less than 25%) with sparse understories. This community becomes a monoculture of *Larrea tridentata* on some limestone-derived soils. It also forms variants with *Gutierrezia sarothrae* and *Eurotia lanata* as locally abundant species. *Gutierrezia sarothrae* is abundant on high, level, well-drained, sandy loam soils derived from limestone. *Eurotia lanata* is most abundant on steep slopes. *Prosopis velutina* shrubs occur in this vegetation in low, wide areas along arroyos.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G?

RANK JUSTIFICATION Not applicable

COMMENTS

This association has affinities with several described types, mostly in the Chihuahuan Desert and in semidesert grasslands.

On the Monument, this association intergrades with the *Canotia holocantha*—*Aristida purpurea* association on slopes. To the east and south of the plot, grasses (mostly *Aristida purpurea*) increase in abundance. Lower on the slopes, this community intergrades with a *Prosopis velutina*/*Celtis reticulata* community with *Acacia greggii* and *Atriplex canescens*. Where the *Aristida purpurea*—*Krameria parviflora* association contains *Canotia holocantha*, it borders the *Larrea tridentata*/*Aristida purpurea* association. What appears to be an archeological site, comprised of a semi-circular, stacked rock wall foundation abutting a *Juniperus osteosperma* tree, is located within this community on the mesa top.

REFERENCES None

## Atriplex canescens / Muhlenbergia porteri Shrubland

COMMON NAME	Four-wing saltbush/Bush muhly Shrubland
SYNONYM	1152.17 in Reichenbacher, 1983.
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Evergreen shrubland
PHYSIOGNOMIC GROUP	Extremely xeromorphic shrubland
FORMATION	Extremely xeromorphic facultatively deciduous subdesert shrubland
ALLIANCE	<i>Atriplex canescens</i> Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed type and distribution unknown.

On the Monument, this association is concentrated on the slopes surrounding the ruins and best developed on the southwest facing slope.

### ENVIRONMENTAL DESCRIPTION

*Tuzigoot National Monument*

This association appears on exposures of alkaline, well-drained, sandy loam soils.

USFWS WETLAND SYSTEM Not applicable.

### MOST ABUNDANT SPECIES

*Globally*

Information not available.

*Tuzigoot National Monument*

#### Strata

Shrub

#### Species

*Atriplex canescens*, *Prosopis velutina*, *Gutierrezia sarothrae*, *Parthenium incanum*, *Eurotia lanata*, *Ephedra viridis*

Herbaceous

*Muhlenbergia porteri*, *Aristida purpurea*, *Bouteloua barbata*, *Bromus rubens*, *Allionia incarnata*, *Setaria viridis*, *Sporobolus crypthanthus*, *Cassia bauhinioides*, *Sphaeralcea* spp., *Erodium* spp.

### DIAGNOSTIC SPECIES

*Globally*

Information not available.

*Tuzigoot National Monument*

*Atriplex canescens*, *Muhlenbergia porteri*

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VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

The *Atriplex canescens*/*Muhlenbergia porteri* association forms an open shrubland composed of several shrub species. *Atriplex canescens* is scattered on the slope from top to bottom, often with *Muhlenbergia porteri* growing underneath. *Eurotia lanata* is most abundant higher on the slope and decreases downslope. At midslope the *Prosopis velutina* is short and shrubby, but at the toe slope it gains stature and is more frequently encountered. *Parthenium incanum* appears in the community on the southeastern exposure at midslope.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G?

RANK JUSTIFICATION Not applicable

COMMENTS

This is a disturbance type that has affinities with previously recognized natural communities, most notably the *Prosopis velutina*/*Muhlenbergia porteri* in New Mexico.

On the Monument, this association abuts mine tailings to the west. To the south, this association merges with the bottomland *Prosopis velutina* associations. On top of the slope, *Eragrostis lehmanniana*-dominated communities border this association along its northern boundary. Northward along the contour, this association meets a representative of the *Prosopis velutina*/*Gutierrezia sarothrae* association. The *Atriplex canescens*—*Muhlenbergia porteri* association gives the area a unique signature on infrared aerial photography.

REFERENCES

Reichenbacher, F.W. 1983. Plant Communities of Arizona. Report to Arizona Natural Heritage Program. Tucson, AZ.

## Chilopsis linearis Shrubland Alliance

COMMON NAME	Desert Willow Shrubland Alliance
SYNONYM	None
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland
FORMATION	Intermittently/seasonally flooded cold-deciduous shrubland*
ALLIANCE	<i>Chilopsis linearis</i> Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed type and distribution unknown.

#### *Tuzigoot National Monument*

The *Chilopsis linearis* community is on the floodplain of the Verde River.

### ENVIRONMENTAL DESCRIPTION

#### *Tuzigoot National Monument*

This *Chilopsis linearis* community appears on the xeroriparian floodplain of the Verde River in rapidly-drained, mostly bare, sandy soils. It also occurs within the sandbars away from the main channel.

USFWS WETLAND SYSTEM Palustrine

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

##### Strata

Shrub

Herbaceous

##### Species

*Chilopsis linearis*

*Salsola kali*, *Heterotheca subaxillaris*, *Setaria viridis*, *Ambrosia  
ancanthicarpa*, *Cynodon dactylon*, *Bromus rubens*, *Panicum obtusum*

### DIAGNOSTIC SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

*Chilopsis linearis*

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VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

This tall, patchy shrubland (may be composed of short trees) is part of the floodplain that experiences frequent soil disturbances. *Salsola kali*, an exotic indicator of recent severe soil disturbance, dominates the ground cover in this occurrence. The area has been disturbed by road construction and by periodic flooding. The rest of the herbaceous understory is not well developed, represented only by a few individual plants of different species.

OTHER NOTEWORTHY SPECIES The exotic tree, *Tamarix chinensis*, appears to be invading the area.

CONSERVATION RANK G?

RANK JUSTIFICATION Not applicable

COMMENTS

This is a disturbance type that has affinities with several riparian communities. *Chilopsis linearis* is a common arroyo species in the Chihuahuan and Sonoran Deserts.

The *Chilopsis linearis* community on the Monument is bordered by the *Populus fremontii*—*Salix gooddingii* association on more mesic sections of the Verde River main channel. Irrigation ditches lined by a luxuriant stand of *Prosopis velutina*, *Celtis reticulata*, *Fraxinus velutina*, *Datura meteloides*, *Cucurbita digita*, and *Vitis Arizonica* border the *Chilopsis linearis* community along its south side.

REFERENCES None

## Prosopis velutina - Celtis laevigata var. reticulata Shrubland

COMMON NAME	Velvet mesquite/Netleaf hackberry Shrubland
SYNONYM	1224.5202 in Reichenbacher, 1983; <i>Prosopis velutina</i> — <i>Celtis laevigata</i> var. <i>reticulata</i>
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland
PHYSIOGNOMIC GROUP	Extremely xeromorphic deciduous shrubland
FORMATION	Extremely xeromorphic deciduous shrubland without succulents
ALLIANCE	<i>Prosopis velutina</i> Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Currently recognized as an Arizona endemic community found in the southern portions of the state.

#### *Tuzigoot National Monument*

This association is best represented on the eastern toe slope below the mesa.

### ENVIRONMENTAL DESCRIPTION

This association is found in and along intermittent drainage channels. It usually appears on nearly level, sand or gravel wash beds with frequent cobbles and boulders, although it can line floodplains on adjacent toe slopes.

#### *Tuzigoot National Monument*

This association generally occurs on toe slopes with well-drained, sandy loam soils. It appears on limestone slopes or on soils with many granitic rocks covering the surface.

USFWS WETLAND SYSTEM Palustrine

### MOST ABUNDANT SPECIES

#### *Globally*

##### Strata

Tree canopy

Shrub

Herbaceous

##### Species

*Celtis reticulata*

*Prosopis velutina*, *Ziziphus obtusifolia*, *Hymenoclea salsola*, *Mahonia trifoliata*, *Lycium pallida*, *Acacia greggii*, *Rhus trilobata*, *Gutierrezia sarothrae*

*Marrubium vulgare*, *Datura meteloides*

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**Tuzigoot National Monument**

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*Tuzigoot National Monument*

<u>Strata</u>	<u>Species</u>
Tree canopy	<i>Celtis reticulata</i>
Shrub	<i>Prosopis velutina</i> , <i>Ziziphus obtusifolia</i> , <i>Mahonia trifoliata</i> , <i>Lycium pallida</i> , <i>Rhus trilobata</i> , <i>Gutierrezia sarothrae</i>
Herbaceous	<i>Bromus rubens</i> , <i>Distichlis stricta</i> , <i>Marrubium vulgare</i> , <i>Solanum douglassii</i> , <i>Capsella</i> spp., <i>Distichlis stricta</i>

DIAGNOSTIC SPECIES

*Globally*

*Celtis reticulata*, *Prosopis velutina*, *Ziziphus obtusifolia*

*Tuzigoot National Monument*

*Celtis reticulata*, *Prosopis velutina*, *Ziziphus obtusifolia*, *Mahonia trifoliata*

VEGETATION DESCRIPTION

*Globally*

This is generally an arroyo and adjacent toe slope association, and it is composed of thickets of shrubs and small trees. Cover varies, as can the height of woody plants, positioned in the channel. The denser, taller communities are apparently associated with great moisture availability. *Celtis reticulata* forms a scattered, short tree layer above or with *Prosopis velutina*. *Prosopis velutina* clearly dominates this community, in which it appears with a variety of shorter shrub species. *Ziziphus obtusifolia* is a constant member of the community, although not prominent in cover. Other common shrubs include *Acacia greggii*, *Mahonia trifoliata*, and *Gutierrezia sarothrae*. The herbaceous component apparently is poorly developed and is represented by a short list of weedy species.

*Tuzigoot National Monument*

This is a highly variable association represented by shrub thickets to open woodlands. In some places this shrubland is so thick that it is impossible for a human to pass through. *Prosopis velutina* dominates throughout this community, and a variety of associated short trees or shrubs can display high cover. *Celtis reticulata* forms a scattered short tree layer above the *Prosopis velutina* and may be absent in portions of the community. *Mahonia trifoliata* can be abundant in the shrub layer below or within the *Prosopis velutina*. *Lycium pallidum* is located along the road in the more xeric or saline areas where it grows scraggly and short in the open areas between *Prosopis velutina* plants. *Ziziphus obtusifolia* rarely occurs abundantly but is a constant member of the community.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G?

RANK JUSTIFICATION

Although "mesquite bosques" are a common feature in Southwestern landscapes, classification of *Prosopis velutina* communities is in need of inventory and analysis. This association has been described in various reports but lacks rigorous evaluation. Without more directed inventory in these communities, the information base is too poor to confidently assign a conservation rank.

COMMENTS

This community intergrades with the *Prosopis velutina/Hordeum jubatum* and the *Prosopis velutina/Distichlis stricta* associations in the bottomland. Upslope this association often merges with *Larrea tridentata* communities. In the wettest areas, this association abuts *Typha angustifolia* marsh. On the Monument, this type is distinguished from the *Prosopis velutina/Hordeum jubatum* by a more diverse

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shrub component and very low cover of *Hordeum jubatum*. It is distinguished from the *Prosopis velutina/ Distichlis stricta* association by high shrub diversity, low cover of *Distichlis stricta*, and the absence of *Aster tephrodes*.

REFERENCES

Anderson, L.S. P.L. Warren and F.W. Reichenbacher. 1985. Vegetation Associations of the Muleshoe Ranch Preserve. Report to The Nature Conservancy. Tucson, AZ. 15p.

McLaughlin, S. and W. Asdall. 1980. An Environmental Inventory of the Rosemont Area in Southern Arizona. Unpublished manuscript for Anamax Mining Company prepared by the University of Arizona.

Reichenbacher, F.W. 1983. Plant Communities of Arizona. Report to Arizona Natural Heritage Program. Tucson, AZ.

## Prosopis velutina / Hordeum jubatum Shrubland

COMMON NAME	Velvet mesquite/Foxtail barley Shrubland
SYNONYM	Mesquite Bosque
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland
PHYSIOGNOMIC GROUP	Extremely xeromorphic deciduous shrubland
FORMATION	Extremely xeromorphic deciduous subdesert shrubland without succulents
ALLIANCE	<i>Prosopis velutina</i> Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed type and distribution unknown.

This is the most abundant association on Tuzigoot National Monument. It is scattered throughout the Monument on low, flat areas. It is best displayed between the marsh and the hill capped by the ruins.

### ENVIRONMENTAL DESCRIPTION

#### *Tuzigoot National Monument*

This association appears on well-drained silt loams and sandy loams, and at the toe slopes of hills. Soils are generally deep, well drained, and on toe slope-derived limestone.

USFWS WETLAND SYSTEM Palustrine

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

##### Strata

Shrub

##### Species

*Prosopis velutina*, *Atriplex canescens*, *Hordeum jubatum*, *Bromus rubens*,  
*Solanum douglassii*, *Salsola kali*, *Datura meteloides*

### DIAGNOSTIC SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

*Prosopis velutina*, *Hordeum jubatum* >25% cover, *Funastrum cynanchoides*

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VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

This association is very diverse and varies with aspect and water regime. In more mesic areas, this community is comprised of very large *Prosopis velutina* trees and shrubs in dense, almost impenetrable stands. However, as the site becomes wet, such as where the marsh has expanded behind the beaver dam, the trees die, and the community opens. The more mesic understories contain either *Hordeum jubatum*, *Cynodon dactylon*, or *Bromus rubens*. More arid areas contain understories of *Distichlis stricta*, *Bouteloua eriopoda*, or *Bouteloua barbata*. Some of the larger openings in the community display concentrations of *Gutierrezia sarothrae*.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G?

RANK JUSTIFICATION Not applicable

COMMENTS

This is a disturbance vegetation type with affinities to several riparian communities.

This association intergrades with most of the other associations described in this report. Although "mesquite bosques" are a common feature in Southwestern landscapes, classification of *Prosopis velutina* communities is in need of inventory and analysis. This association may have been described in various reports; but, lacking rigorous evaluation, any comparison would be tenuous. Without more directed inventory in these communities, the information base is too poor to confidently assign a conservation rank.

REFERENCES None

## Prosopis velutina / Distichlis stricta Herbaceous Vegetation

COMMON NAME	Velvet mesquite/Saltgrass Herbaceous Vegetation
SYNONYM	None
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Herbaceous
PHYSIOGNOMIC SUBCLASS	Perennial graminoid grassland
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial grassland with shrub layer
FORMATION	Intermittently flooded short perennial grassland with shrub layer*
ALLIANCE	<i>Distichlis stricta</i> Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed type and distribution unknown. This may be a variant of the regional *Distichlis stricta* association that is distributed throughout inland western North America in dry, saline environments.

### *Tuzigoot National Monument*

The *Prosopis velutina*—*Distichlis stricta* association is located around the marsh.

### ENVIRONMENTAL DESCRIPTION

The *Prosopis velutina*—*Distichlis stricta* association is most common in the drier areas adjacent to the marsh. It is located in poorly-drained, alkaline, clay loam soil. A salt crust is often present on soil between grass tufts.

USFWS WETLAND SYSTEM Palustrine

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available.

### *Tuzigoot National Monument*

#### Strata

Shrub

#### Species

*Prosopis velutina*, *Atriplex canescens*, *Gutierrezia sarothrae*, *Kochia scoparia*

Herbaceous

*Distichlis stricta*, *Aster tephrodes*, *Solanum douglassii*, *Xanthium strumarium*, *Cirsium neomexicanum*, *Rumex crispus*

### DIAGNOSTIC SPECIES

#### *Globally*

Information not available.

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*Tuzigoot National Monument*

*Prosopis velutina, Distichlis stricta, Aster tephrodes, Kochia scoparia*

VEGETATION DESCRIPTION

*Globally*

Information is not available.

In the Monument, this association is represented by complex vegetation. *Prosopis velutina* is generally less than 2 meters tall, with a patchy coverage that may approach 25% in some areas and is absent in others. An abundance of *Distichlis stricta*, often forming a carpet and displaying well over 50% coverage, characterizes this community. *Aster tephrodes* is rare but always present and, from data on the Monument, is restricted to this community.

OTHER NOTEWORTHY SPECIES

*Kochia scoparia*, an exotic species, is common in this community and locally can be abundant.

CONSERVATION RANK G?

RANK JUSTIFICATION Not applicable

COMMENTS

This association generally borders the marsh and merges with the *Prosopis velutina/Hordeum jubatum* association. *Distichlis stricta* association is found throughout the inland western U.S. It forms associations with a variety of shrub species and develops grasslands devoid of woody plants. This new association may represent a variant in this spectrum of related communities found in saline environments.

REFERENCES None

## Prosopis velutina — Gutierrezia sarothrae Shrubland

COMMON NAME	Velvet mesquite—Snakeweed Shrubland
SYNONYM	Possibly 1153.2401 in Reichenbacher, 1983.
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland
PHYSIOGNOMIC GROUP	Extremely xeromorphic deciduous shrubland
FORMATION	Extremely xeromorphic deciduous shrubland without succulents
ALLIANCE	<i>Prosopis velutina</i> Shrubland Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed type and distribution unknown.

#### *Tuzigoot National Monument*

This community is best represented on the west side of the study area in the bottomlands between the visitor center and the mine tailings.

### ENVIRONMENTAL DESCRIPTION

On the survey area, this community is common along the toe slopes of hills on sandy, clay loam soil. The soil surface is bare, crusted, and reddish-gray.

USFWS WETLAND SYSTEM Not applicable.

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

##### Strata

Shrub

##### Species

*Prosopis velutina*, *Gutierrezia sarothrae*, *Acacia greggii*, *Eriogonum deflexum*

Herbaceous

*Bromus rubens*, *Marrubium vulgare*, *Cassia bauhiniodes*, *Capsella* spp.

### DIAGNOSTIC SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

*Prosopis velutina*, *Gutierrezia sarothrae*

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VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

The *Prosopis velutina/Gutierrezia sarothrae* association is common in disturbed areas that apparently have received heavy grazing in the past. *Juniperus erythrocarpa* plants outside of the plot were young and appear to be invading this community. *Eriogonum deflexum* is abundant south of the personnel housing area. Where *Eriogonum deflexum* is common, *Hilaria mutica* (an indicator of heavy clay soils) grows along the banks of the arroyos. This area has a darker signature on the infra-red aerial photographs. The *Prosopis velutina/Gutierrezia sarothrae* association intergrades with the *Prosopis velutina* bottomland communities and may reappear in large clearings within them. This association is a common occurrence to the south of the ruins.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G?

RANK JUSTIFICATION Not applicable

COMMENTS

This is a disturbance vegetation type with affinities to many community types.

On the east side of the monument, this association merges with *Prosopis velutina/Distichlis stricta* association. Around the ruins themselves, it intergrades with the *Atriplex canescens/Muhlenbergia porteri* association.

REFERENCES

Reichenbacher, F.W. 1983. Plant Communities of Arizona. Report to Arizona Natural Heritage Program. Tucson, AZ.

## Typha angustifolia Herbaceous Alliance

COMMON NAME	Narrowleaf cattail Herbaceous Alliance
SYNONYM	1244.7100 in Reichenbacher, 1983.
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Herbaceous
PHYSIOGNOMIC SUBCLASS	Perennial graminoid
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial grassland
FORMATION	Seasonally flooded/temporarily flooded temperate or subpolar perennial grassland
ALLIANCE	<i>Typha angustifolia</i> Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Cattail marshes are widespread, but have not been adequately classified in the literature. Related types occur throughout the Great Plains and the western, midwestern and eastern U.S.

### *Tuzigoot National Monument*

This association is most abundant to the east of the Tuzigoot Visitor Center. The association abuts the beaver dam and the Verde River to the south.

### ENVIRONMENTAL DESCRIPTION

#### *Tuzigoot National Monument*

It develops in semi-permanently to permanently flooded (often riverine) habitats. It is located on very poorly- drained, sandy loam soils to mucky soils.

USFWS WETLAND SYSTEM Palustrine

### MOST ABUNDANT SPECIES

#### *Globally*

<u>Strata</u>	<u>Species</u>
Herbaceous	<i>Typha</i> spp., <i>Scirpus</i> spp., <i>Eleocharis</i> spp.

#### *Tuzigoot National Monument*

<u>Strata</u>	<u>Species</u>
Shrub	<i>Baccharis salicifolia</i>
Herbaceous	<i>Typha angustifolia</i> , <i>Scirpus validus</i> , <i>Eleocharis parishii</i> , <i>Lycopus</i> spp., <i>Cynodon dactylon</i> , <i>Sporobolus airoides</i> , <i>Distichlis stricta</i>

### DIAGNOSTIC SPECIES

#### *Globally*

*Typha* spp.

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#### *Tuzigoot National Monument*

*Typha angustifolia*, *Scirpus validus*, *Lycopus* spp.

#### VEGETATION DESCRIPTION

This widespread alliance has not been well classified globally. Examples usually include a single tall graminoid layer composed of *Typha* spp. intermixed with patches of *Scirpus* spp., and/or *Eleocharis* spp., among other wetland species.

#### *Tuzigoot National Monument*

This alliance occurs as a complex mosaic of co-dominance and monocultures of *Typha angustifolia* and *Scirpus validus*. *Typha angustifolia* tends to dominate the marsh near the dams to the south, while *Scirpus validus* tends to be more abundant northward or upstream. The stream, pond, and marsh banks or higher microsites may contain *Cynodon dactylon*, *Muhlenbergia asperifolia*, *Distichlis stricta*, *Lycopus* spp., or *Eleocharis parishii*. *Eleocharis parishii* can be very dense, providing complete cover in some areas. *Prosopis velutina*, along with several other woody species, appear within the marsh, usually as dying individual plants.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G5?

#### RANK JUSTIFICATION

The floristic variation within this vegetation and the processes associated with it have yet to be documented. Its apparent abundance and lack of definition indicate an ambiguous conservation rank.

#### COMMENTS

This association is bordered by all the bottomland *Prosopis velutina* associations. This is a community that can develop wherever water is impounded. This marsh association is dynamic vegetation on the Monument. The presence of the weir dam and beaver has and will continue to create hydrologic regimes conducive to the development of this association. Because many areas are newly flooded, there is a mixing of more upland species within the marsh or isolated pockets of marsh species within otherwise recognizable upland associations. The changing flood patterns also result in patches of dying or dead *Scirpus validus*. Transition communities that are clearly becoming more wet are included within this association.

#### REFERENCES

Reichenbacher, F.W. 1983. Plant Communities of Arizona. Report to Arizona Natural Heritage Program. Tucson, AZ.

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Muhlenbergia asperifolia — Eleocharis parishii Herbaceous Vegetation

COMMON NAME	Alkali muhly—Spike rush Herbaceous Vegetation
SYNONYM	None
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Herbaceous
PHYSIOGNOMIC SUBCLASS	Perennial graminoid
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial grassland
FORMATION	Intermittently flooded temperate or subpolar perennial grassland
ALLIANCE	<i>Muhlenbergia asperifolia</i> Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

RANGE

Undefined and undescribed vegetation type.

*Tuzigoot National Monument*

This association is adjacent to the marsh.

ENVIRONMENTAL DESCRIPTION

*Tuzigoot National Monument*

This association occurs on very poorly-drained, silt loam soils adjacent to the marsh.

USFWS WETLAND SYSTEM Palustrine

MOST ABUNDANT SPECIES

*Globally*

Information not available.

*Tuzigoot National Monument*

Strata

Herbaceous

Species

*Muhlenbergia asperifolia, Eleocharis parishii, Cynodon dactylon*

DIAGNOSTIC SPECIES

*Globally*

Information not available.

*Tuzigoot National Monument*

*Muhlenbergia asperifolia, Eleocharis parishii*

VEGETATION DESCRIPTION

*Globally*

Information is not available.

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#### *Tuzigoot National Monument*

This is a simple vegetation type with only three species of any prominence: *Muhlenbergia asperifolia*, *Eleocharis parishii*, and *Cynodon dactylon* (in order of abundance). Other species are present in the community but contribute little to composition or structure of the vegetation. *Muhlenbergia asperifolia* forms the upper layer, up to 0.5 meter tall, of the community in combination with its two shorter associates. *Eleocharis parishii* is most abundant on more semi-permanently flooded soils, whereas *Cynodon dactylon* forms short grass layer on better-drained microsites. At Tuzigoot National Monument, this association is ecologically intermediate between more mesic *Cynodon dactylon* monocultures and more xeric *Distichlis stricta* stands.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G?

RANK JUSTIFICATION Not applicable

#### COMMENTS

This type may be a variant of the *Muhlenbergia asperifolia* association tentatively recognized in the Great Basin and Colorado Plateau.

On the Monument, this community intergrades with the *Prosopis velutina* associations and on wetter sites with *Scirpus validus* stands in the marsh.

#### REFERENCES

Bolen, E.G. 1964. Plant Ecology of Spring-fed Salt Marshes in Western Utah. *Ecological Monographs* 34(2):143-166.

## Cynodon dactylon Herbaceous Alliance

COMMON NAME	Bermuda grass Herbaceous Alliance
SYNONYM	Bermuda grass abandoned field
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Herbaceous
PHYSIOGNOMIC SUBCLASS	Perennial graminoid
PHYSIOGNOMIC GROUP	Temperate and subpolar perennial grassland
FORMATION	Semi-cultivated temperate and subpolar perennial grassland
ALLIANCE	<i>Cynodon dactylon</i> Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed vegetation type and distribution unknown.

#### *Tuzigoot National Monument*

This vegetation is located next to the old dairy and adjacent to and along the marsh's southwestern side.

### ENVIRONMENTAL DESCRIPTION

#### *Tuzigoot National Monument*

The vegetation occupies level, moderately-well to poorly-drained silt loam, sandy loam or silt clay loam soils. Soils are generally lightly colored and may have an abundant litter and duff layer. This association occupies sites that are abandoned fields.

USFWS WETLAND SYSTEM Not applicable

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

##### Strata

Shrub

Herbaceous

##### Species

*Kochia scoparia*, *Baccharis salicifolia*, *Prosopis velutina*

*Cynodon dactylon*, *Eleocharis parishii*, *Distichlis stricta*, *Plantago lanceolata*, *Muhlenbergia asperifolia*, *Cirsium* spp.

### DIAGNOSTIC SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

*Cynodon dactylon* >50% cover

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VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

The vegetation represents abandoned fields that are in a state of flux as processes not directly mitigated by humans are replaced by more natural processes. Species composition is highly variable, but this association is composed primarily of exotic species. This community is found on more stabilized disturbed areas near the marsh.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G5

RANK JUSTIFICATION

Exotic-dominated vegetation types have no known conservation value.

COMMENTS

This vegetation borders the marsh or the *Muhlenbergia asperifolia*—*Eleocharis parishii* association on the north. The latter also occupies sites to the east. Bottomland and riparian associations border on the south.

REFERENCES None

## Eragrostis lehmanniana Herbaceous Alliance

COMMON NAME	Lehmann's lovegrass Herbaceous Alliance
SYNONYM	None
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Herbaceous
PHYSIOGNOMIC SUBCLASS	Perennial graminoid
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial grassland
FORMATION	Medium-tall sod temperate or subpolar perennial grassland
ALLIANCE	<i>Eragrostis lehmanniana</i> Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undefined and undescribed vegetation type.

#### *Tuzigoot National Monument*

This community appears in two distinct locations: on mine tailings and along roadsides east of the visitor center.

### ENVIRONMENTAL DESCRIPTION

This association is found on moderately well-drained mine tailings with a fine sand texture on which salt crusts are common on the soil surface. It also occurs on disturbed soils (i.e. adjacent to bladed road), on moderately well-drained, compacted sandy loam.

USFWS WETLAND SYSTEM Not applicable

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

##### Strata

Shrub

Herbaceous

##### Species

*Tamarix chinensis*, *Gutierrezia sarothrae*

*Eragrostis lehmanniana*, *Setaria viridis*, *Aristida purpurea*, *Salsola kali*,  
*Digitaria californica*

### DIAGNOSTIC SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

*Tamarix chinensis*, *Eragrostis lehmanniana*, *Setaria viridis*, *Salsola kali*, *Digitaria californica*

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VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

The *Eragrostis lehmanniana* alliance represents disturbed vegetation dominated by an invasive, exotic grass. It was sampled in two areas: 1) concentrated on small berms within the mine tailings, and 2) along the dirt road north of the visitor center. The *Eragrostis lehmanniana* vegetation, as it appears on the visitor center hill, is densely vegetated, with an abundance of *Aristida purpurea*, and borders the *Aristida purpurea*—*Krameria parvifolia* association. In the mine tailings, this vegetation is very sparse (around 25% total cover). *Setaria viridis* is always associated with *Eragrostis lehmanniana*.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G5

RANK JUSTIFICATION Exotic dominated vegetation types have no known conservation value.

COMMENTS

Both sampled occurrences of the alliance border *Prosopis velutina*—*Gutierrezia sarothrae* communities. *Eragrostis lehmanniana* is an aggressive exotic species that forms communities in severely disturbed areas with other weedy species and in less disturbed sites mixing with residual native species.

REFERENCES None

## Aristida purpurea — Krameria parvifolia Herbaceous Vegetation

COMMON NAME	Purple three-awned needlegrass—Range ratany Herbaceous Vegetation
SYNONYM	None
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Herbaceous
PHYSIOGNOMIC SUBCLASS	Perennial graminoid
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial grassland with a shrub layer
FORMATION	Medium-tall temperate grassland with an extremely xeromorphic shrub layer
ALLIANCE	<i>Aristida purpurea</i> Herbaceous Alliance

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed type and distribution unknown.

#### *Tuzigoot National Monument*

This association is found on the north end of the hill capped with the ruins.

### ENVIRONMENTAL DESCRIPTION

#### *Tuzigoot National Monument*

This community occurs on eastern exposures with approximately 20 degree slopes. Soils are light colored, well- drained, sandy loam. The soil was derived from limestone parent material.

USFWS WETLAND SYSTEM Not applicable

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

##### Strata

Shrub

Herbaceous

##### Species

*Krameria parvifolia*, *Acacia greggii*, *Yucca baccata*, *Yucca elata*

*Aristida purpurea*, *Bouteloua curtipendula*, *Tridens muticus*, *Allionia incarnata*, *Capsella* spp.

### DIAGNOSTIC SPECIES

#### *Globally*

Information not available.

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*Tuzigoot National Monument*

*Aristida purpurea* >25% cover, *Krameria parvifolia*

VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

This association has a well-developed grass component both in total cover (over 50%) and diversity of grass species. *Aristida purpurea* is by far the most common grass, followed in abundance by two perennial species of *Bouteloua* and *Erioneuron mutica*. Shrub cover is scattered and varied. *Acacia greggii* and two *Yucca* species are the most prominent shrubs, although the short shrub, *Krameria parviflora*, contributes the most cover to the community.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK G?

RANK JUSTIFICATION Not applicable

COMMENTS

This association has affinities with warm, temperate, semi-desert grasslands.

On top of the bluffs, north of the plot, this association intergrades with the *Larrea tridentata/Aristida purpurea* association. Where this vegetation type is disturbed through road construction, it is prone to invasion by *Eriagrostis lehmanniana*.

REFERENCES None

## Intermittently Flooded Cold-deciduous Shrubland Formation

COMMON NAME	None
SYNONYM	None
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Shrubland
PHYSIOGNOMIC SUBCLASS	Deciduous shrubland
PHYSIOGNOMIC GROUP	Cold-deciduous shrubland
FORMATION	Intermittently flooded cold-deciduous shrubland*
ALLIANCE	None

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed type recognized as repeating vegetation on a particular hydrologic surface in the arid western U.S.

#### *Tuzigoot National Monument*

This formation is on the floodplain of the Verde River.

### ENVIRONMENTAL DESCRIPTION

This formation appears on river flood bars that are denuded of vegetation by intermittent flood events at long intervals (decades). The coarse-textured bars are well above the water table, excessively well drained, and thus create a xeric environment in the flood plain.

#### *Tuzigoot National Monument*

This formation appears on the xeroriparian floodplain of the Verde River in rapidly-drained, coarse-textured soils. It is best represented in the oxbow, north of the active channel and south of the old channel that is currently lined with *Populus fremontii* and *Prosopis velutina* trees.

USFWS WETLAND SYSTEM Palustrine

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

##### Strata

Shrub

Herbaceous

##### Species

*C.f. Baccharis sergiloides, Prosopis velutina, Baccharis salicifolia*

*Salsola kali, Hordeum jubatum, Solanum douglassii, Bromus rubens, Heterothecea subaxillaris*

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DIAGNOSTIC SPECIES

*Globally*

Information not available.

*Tuzigoot National Monument*

*C.f. Baccharis sergiloides*

VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

The vegetation representing this formation is co-dominated by *c.f. Baccharis sergiloides* and *Salsola kali*, an exotic indicator of recent severe soil disturbance. It is very dense vegetation, composed of tall annual and perennial forbs and scattered deciduous shrubs, of which *Prosopis velutina* is most obvious. General appearance of the vegetation is very "weedy," reflecting the disturbance and harsh character of its environment. It is bordered by the Verde River and by riparian communities that are associated with more moisture or less disturbed by periodic flooding. Many bare areas within the community are associated with anthills. Additional study of these hydrological surfaces throughout the arid southwest may reveal that this vegetation is akin to the *Baccharis sarothoides*-*Baccharis salicifolia* alliance.

OTHER NOTEWORTHY SPECIES The exotic tree, *Tamarix chinensis*, appears to be invading the area.

CONSERVATION RANK GU

RANK JUSTIFICATION Not applicable

COMMENTS

This is a disturbance type that has affinities with several riparian communities, notably the *Chilopsis linearis* community, which is a member of this formation. Without periodic flooding, this vegetation will tend to develop into a *Prosopis velutina* bosque community.

REFERENCES

Richter, Brian. 1996. Personal Communication. National Hydrologist for The Nature Conservancy, Boulder, Colorado.

## Semi-natural Herbaceous Vegetation Subgroup

COMMON NAME	None
SYNONYM	None
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Herbaceous
PHYSIOGNOMIC SUBCLASS	Perennial vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial forb vegetation
FORMATION	None
ALLIANCE	None

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed vegetation type and distribution unknown.

#### *Tuzigoot National Monument*

This type appears on disturbed sites surrounding the weir dam and other disturbance patches in the *Prosopis velutina* bosque.

### ENVIRONMENTAL DESCRIPTION

This association develops on partially denuded soil surfaces in natural or semi-natural vegetation.

#### *Tuzigoot National Monument*

The association occurs on moderately well-drained, silty clay to silty sand soils.

USFWS WETLAND SYSTEM Not applicable

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

##### Strata

Shrub

Herbaceous

##### Species

*Kochia scoparia*, *Prosopis velutina*

*Cirsium* spp, *Amaranthus* sp., *Distichlis stricta*, *Cynodon dactylon*, *Bromus rubens*, *Salsola kali*

### DIAGNOSTIC SPECIES

#### *Globally*

Information not available.

**USGS-NPS Vegetation Mapping Program**  
**Tuzigoot National Monument**

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*Tuzigoot National Monument*  
*Cirsium* spp.

VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

This type is dominated by annual and perennial forbs and grasses. A tall, perennial *Cirsium* species is often prominent, although other species, such as *Salsola kali*, can locally be dominant. A variety of perennial species contribute the most cover to the vegetation. A few native plants are found as residuals of the previous natural or semi-natural vegetation. *Prosopis velutina* sprouts or seedlings are the most obvious native plants.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK GU

RANK JUSTIFICATION Not applicable

COMMENTS

This community represents disturbance vegetation dominated by exotic species.

This community is dominated by an ephemeral species, so it is highly variable in species composition, structure, and spatial extent.

REFERENCES None

## Semi-cultivated Herbaceous Vegetation Subgroup

COMMON NAME	None
SYNONYM	None
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Herbaceous
PHYSIOGNOMIC SUBCLASS	Perennial vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar perennial forb vegetation
FORMATION	None
ALLIANCE	None

CLASSIFICATION CONFIDENCE LEVEL 3

### RANGE

Undescribed vegetation and distribution on newly abandoned cultivated or urbanized terrestrial land worldwide.

#### *Tuzigoot National Monument*

This type appears on the abandoned dairy farm and surrounding land.

### ENVIRONMENTAL DESCRIPTION

This type develops on nearly denuded soil surfaces, i.e. fallow fields, roadsides, and vacant lots.

#### *Tuzigoot National Monument*

This type occurs on moderately well-drained, deep, silty, clay loam soils that are exposed during cultivation and activity related to a dairy operation.

USFWS WETLAND SYSTEM Not applicable

### MOST ABUNDANT SPECIES

#### *Globally*

Information not available.

#### *Tuzigoot National Monument*

##### Strata

Herbaceous

##### Species

*Salsola kali*, *Cirsium* spp., *Amaranthus* spp., *Bromus rubens*

### DIAGNOSTIC SPECIES

#### *Globally*

Information not available.

**USGS-NPS Vegetation Mapping Program**  
**Tuzigoot National Monument**

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*Tuzigoot National Monument*  
*Salsola kali*

VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

This type is dominated by annual and perennial forbs and grasses. The tall, annual, *Salsola kali* is the most prominent plant, although a variety of perennial species contribute the most cover to the vegetation. Few, if any, native plants are found in this vegetation. This community can be very dense.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK GU

RANK JUSTIFICATION Not applicable

COMMENTS

This community represents disturbance vegetation dominated by exotic species.

This community is dominated by an ephemeral species, so it is highly variable in species composition, structure, and spatial extent.

REFERENCES None

**USGS-NPS Vegetation Mapping Program**

**Tuzigoot National Monument**

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Low Temperate Intermittently Exposed Annual Forb Vegetation Formation

COMMON NAME	None
SYNONYM	None
TNC SYSTEM	Terrestrial
PHYSIOGNOMIC CLASS	Herbaceous
PHYSIOGNOMIC SUBCLASS	Annual vegetation
PHYSIOGNOMIC GROUP	Temperate or subpolar annual grassland or forb vegetation
FORMATION	Low temperate intermittently flooded annual forb vegetation
ALLIANCE	None

CLASSIFICATION CONFIDENCE LEVEL 3

RANGE

Undescribed vegetation type and distribution unknown.

*Tuzigoot National Monument*

This type appears next to the Verde River as a long, narrow band. The presence, extent, and location of this vegetation will vary greatly throughout and among growing seasons.

ENVIRONMENTAL DESCRIPTION

This association develops on seasonally denuded soil surfaces created by periodic river flooding.

*Tuzigoot National Monument*

This type occurs on moderately well-drained, coarse- textured parent material within the river floodplain.

USFWS WETLAND SYSTEM Palustrine

MOST ABUNDANT SPECIES

*Globally*

Information not available.

*Tuzigoot National Monument*

Strata

Herbaceous

Species

An unidentified species in the Mint Family (*Labiatae*)

DIAGNOSTIC SPECIES

*Globally*

Information not available.

*Tuzigoot National Monument*

Unidentified species in the Mint Family (*Labiatae*)

**USGS-NPS Vegetation Mapping Program**  
**Tuzigoot National Monument**

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VEGETATION DESCRIPTION

*Globally*

Information is not available.

*Tuzigoot National Monument*

This type is composed only of an unidentified species in the Mint Family (*Labiatae*). It is bordered by the active channel of the Verde River and by an unvegetated gravel bar.

OTHER NOTEWORTHY SPECIES None

CONSERVATION RANK GU

RANK JUSTIFICATION Not applicable

COMMENTS

This community represents a natural disturbance vegetation dominated by an annual species.

REFERENCES None