Plant Utilization in Southeastern New Mexico: Botany, Ethnobotany and Archaeology

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Note: Manual of plants of anthropological, archaeological, and ecological importance in Southeastern New Mexico.

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Botany, Ethnobotany, and Archaeology

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Dedication

Development and human impacts continue to transform our natural world so that many of the plants and habitats photographed for this book no longer exist apart from their images. In a sense, this book is a reproduction and a commemoration of individual plants and unique places that exist in the past. Similar plants and habitats can still be found, of course, but as time goes on the descriptions and images will become increasingly historical. This book is therefore dedicated to its source material: the wonder-filled natural ecosystems that humans have relied on throughout time for nourishment and wisdom.

Preface

"It is a blessing for the People to have been remembered in this book when so many other books have erased the Lipan from our history and our homelands. This will be an important book to the Lipan People." - Lipan Elder, 2016

The "Great Forgetting," a process of slowly forgetting the past and the traditional ways of all cultures, is occurring at an alarming rate all across the globe. This text has many purposes, as will be seen, but the primary task is to compile and preserve information from many cultural groups and their traditional knowledge.

To this end, in the summer of 2014, the Carlsbad Field Office (CFO) of the Bureau of Land Management (BLM) contracted with SWCA Environmental Consultants to produce a reference book of Southeastern New Mexico plant use based on the results of archaeological work conducted via the Permian Basin Programmatic Agreement (PBPA), The Permian Basin Programmatic Agreement is a covenant between the Advisory Council on Historic Preservation, The New Mexico State Historic Preservation Officer, and the Bureau of Land Management New Mexico State Office. There are multiple concurring parties that include The New Mexico Oil and Gas Association, and the Independent Petroleum Association of New Mexico, among others. The PBPA provides funds for scientific research outside of the normal compliance process set up by Section 106 legislation.

This book takes the accumulated knowledge from the last century of botanical, ethnobotanical and archaeological research in the CFO-BLM region and summarizes it in a reference book that strives to appeal to both working archaeological professionals and members of the public. Information about plants in the archaeological, botanical, and ethnobotanical fields of study is a vast literature, and this project could have become a multi-decade project if strict boundaries were not set up at the onset to produce a concise scope both in geography, species, and history. This text was never envisioned to be a comprehensive encyclopedia of all plants within southeast New Mexico (see *Flora Neomexicana* [Allred and Ivy 2012] for a complete listing of all New Mexico plants), or a summary of all known plant uses by Native American groups in the Southwest (see *Native American Ethnobotany* [Moerman 1998] for a listing of all ethnobotanical sources for North America).

Instead, this book aims to be a focused text, creating a snapshot of the CFO-BLM region, which can be built upon in the future.

Even with a narrow scope, the effort to compile this text brings together information from over 300 archaeological sites and the published resources from those studies, plant range and distribution data, and ethnographic and historical documents, to present detailed information pages about 178 plant species in 55 families. Over 800 photographs, maps, illustrations, and information boxes create a visually dynamic and useful book.

The plants are presented in alphabetical order by family, but with enough pictures to make identification fast and simple. Every effort has been made to find information on flowering and fruiting times, ethnographic and modern uses, and of source images taken by trained botanists from the region. Where archaeological information is known about a species this is also included.

We hope you enjoy this reference manual, and find it helpful while you are in the field and when you want to quickly find information about plants growing in the CFO region.

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Acknowledgements

This book is based on years of effort by the authors and contributors cited in the text and included in the bibliography. Also, special thanks to the generous photographers: Patrick Alexander, Terry Gregston, Gene Jercinovic, Russ Kleinman, Greg Mastropietro, George Miller, Max Licher and Lisa Mandelkern, Chris Carlson, and Martin Stein, who donated hundreds of photographs of plants for the education and benefit of this book's readers. Without their hard work hiking over miles of rough terrain, searching under and through spiny shrubs for uncommon plants, this book would not have been possible.

The authors would like to acknowledge the following people who have been invaluable in the production of this text: Adrian Martinez, Nina Williams, Danielle Desruisseaux, Matt Bandy, Emily Stovel, and Alpha Graphics.

This work was funded through the Permian Basin Programmatic Agreement.

Caution!

The authors are not responsible for the use or misuse of information in this book. This book is intended as a general guide for the identification of plants and the enumeration of their documented prehistoric and historic uses; it is not an instruction manual about how to use these wild plants for medicine or food.

There are important differences between the scholarly archaeological and ethnobotanical information contained in this book and the skill and practice needed to use wild plants for medicine and food. **This book does not constitute complete or adequate instruction in the identification and preparation of wild plants**, and therefore foraging for wild food or medicine should not be attempted based on the information provided in this book.

Furthermore, there are simply too many people living in the modern world for all of us to live off the land by harvesting wild plants. If you do choose to experiment with collecting wild plants in a legal manner, always leave enough behind for the plants to survive.

Please keep in mind that every plant book has errors, and every person who uses a plant book makes errors. For the identification of plants it is always best to rely on multiple books and multiple people. In other words, while all efforts have been made to ensure the accuracy of the information in this book, always cross-check both the identification and the uses of these plants with other sources.

While federal regulations allow for small amounts of plant parts to be collected on public land, commercial, endangered and threatened species collections requires special permits. Most cacti and other slow growing, long lived plants may not be collected. Always check with owners or land managers before collecting any wild plants.

Be aware that environmental contaminants may impact the safety of wild foraging. Plants near roads are usually coated with a mix of road grime and diesel exhaust, and even far from a paved road there can be herbicides or other chemicals that render wild plants unsafe to eat.

Purpose and Scope

Southeastern New Mexico is a crossroads, both in place and time, a place where cultures have traversed for over 10,000 years, and where plants and animals have adapted to the special challenges the landscape presents. Over time, Southeastern New Mexico has been the home to many cultures, each leaving their mark on the landscape; in archaeological sites, modern habitations, introduction of non-native species, habitat change and in direct modifications to the landscape. The history of human occupation can be seen everywhere, if you know where to look and how to recognize the signs.

How to Use this book

This reference guide is a visual summary of the plant species used most often by prehistoric, historic, and modern peoples in Southeast New Mexico. Every effort was made to research archaeological, ethnohistoric, and botanical information for the species presented in this guide. Each species has the following features, in a common layout for easy access and quick referencing.

The species descriptions in this guide are organized alphabetically by family. Using plant families is probably the most important key to learning and understanding botany. For example, if you find a flower with a broad disk of many tiny flowers surrounded by a ring of long petals, you know you are looking at a plant in the sunflower (Asteraceae) family. Knowing the most common families, which include Mustards (Brassicaceae), Mint (Lamiaceae), Four O'clock (Nyctaginaceae), Evening Primrose (Onagraceae), Rose

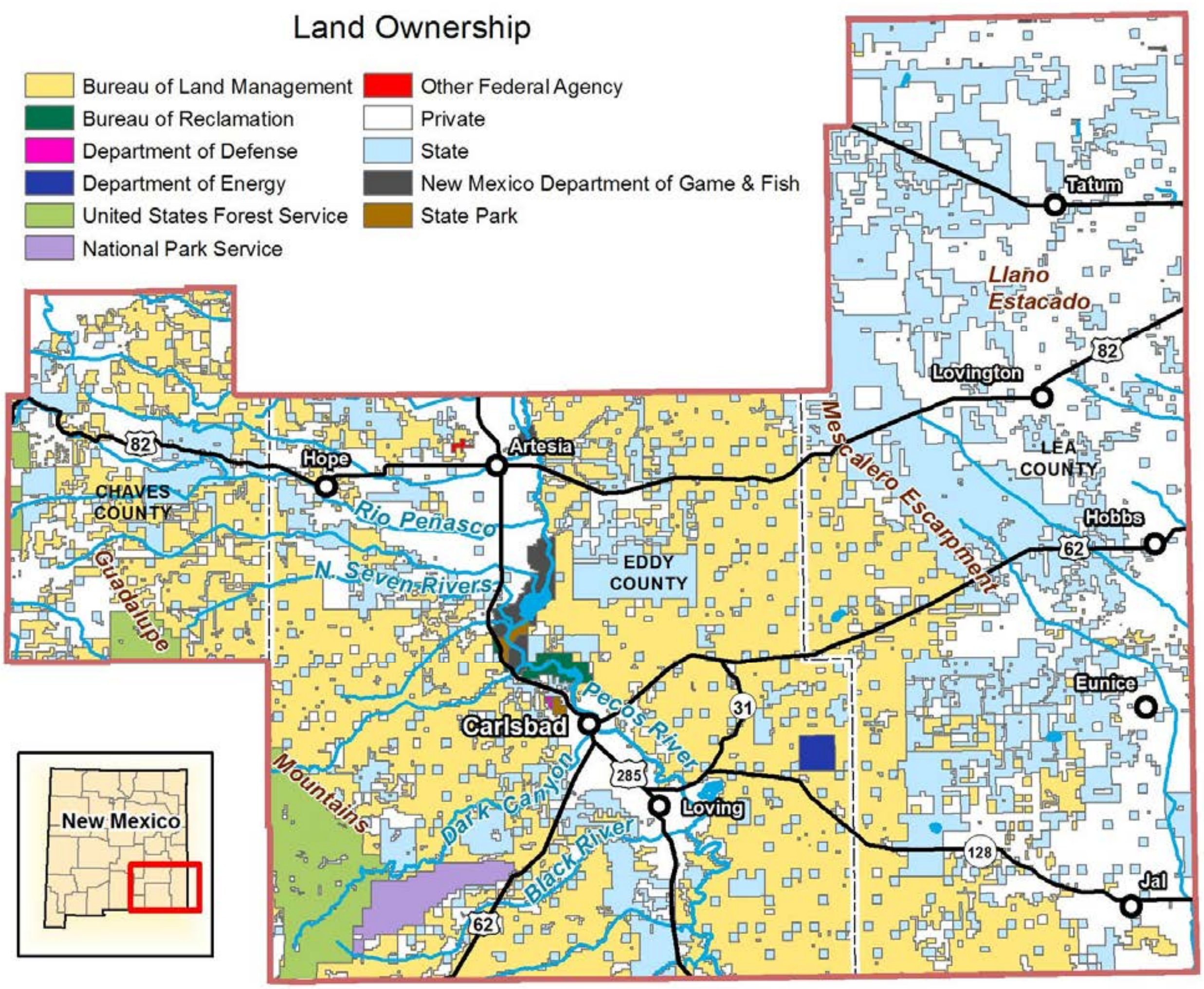


Figure 1:.The CFO region, showing land ownership.

(Rosaceae) will allow you to use this guide most effectively. Brief summaries of the important differences between species in selected plant families in this guide can be found at the beginning of the family's section (for example the Asteraceae family has a summery with twenty five species, while the Nyctaginaceae does not, it has only one covered species.

If you don't already know what family a plant is in, try looking in the index. If you don't find it there you can try consulting a botanical key like *Flora Neomexicana III*, find an expert, or simply thumb through this book. Not every species in the area has photos here, but most of the common ones do and the odds are good you'll find the species you're looking for, or at least a similar species in the same family.

Criteria for Inclusion in This Reference Manual

There are over 500 species of plants that could be included if we look at all of the ecosystems in the CFO. The following eight criteria were used to select plants from all the species that have been recorded as present in a number of botanical overviews:

1. Plants found in the local archeological record.

2. Plants that were likely used, but do not appear in the local archeological record.

3. Plants with documented cultural uses by local Native American Groups.

4. Plants with documented cultural uses by broadly-defined Apache peoples.

5. Plants with documented cultural uses by other native peoples also found in the CFO.

6. Plants with documented cultural uses by European settlers.

7. Plants without documented cultural uses, but extremely common.

8. Plants with important properties (e.g. poisonous, invasive) in the CFO.

These criteria gives us 172 species represented in this text .

Botanical Species Descriptions

The plant descriptions have been standardized for ease of use, these features are explained below.

Sources

Species descriptions were based on *Flora Neomexicana III* by Allred and Ivey, published in 2012, SEINet (swbiodiversity.org) and Flora of North America descriptions (floranorthamerica.org) (publication date varies). Many other Internet sources were consulted, with special thanks to SW Colorado Wildflowers (swcoloradowildflowers.com), the Lady Bird Johnson Wildflower Center (wildflower.org), Vascular Plants of the Gila Wilderness (wnmu.edu/academic/nspages/gilaflora/index.html), and V Plants (vplant.org). Where conflicting information was encountered we attempted to include the range of characteristics in our description. However, none of these sources is infallible, and intermediate or idiosyncratic forms that do not fit the descriptions in this book are bound to be encountered.

Naming Conventions – Taxonomy

This book is not written as a formal botanical treatment; while we have attempted to include most of the common plants in the CFO, there are hundreds of plants that were not included. Common and scientific names are given based on those established by the USDA Natural Resources Conservation Service in their PLANTS database (plants.usda.gov/java/). Botany is a continuously evolving science, and the scientific names in *Flora Neomexicana* are often different from the Flora of North America, which is often different from USDA PLANTS. Where alternate names are still in common use we have attempted to include them in the species descriptions. There are many common names for a given plant depending on the region, cultural background, and language of the speaker. Unfortunately we have not been able to include Spanish or Apache names for many species due to lack of reliable sources.

Botanical Descriptions

Species descriptions were written in the simplest language possible. In some cases this may increase ambiguity, especially for professionally trained botanists who are accustomed to traditional botanical terminology and nomenclature, but in many more cases we believe these descriptions will be more useful and more accessible to the general public as well as professionals. Whenever possible, exact measurements are given rather than vague terms. Measurements are given in metric notation, the notation of botany and all scientific investigations.

Phenology (Plant Life Cycle)

Phenology is the study of the timing of plant growth, flowering, and seed production. These life events are variable for different plants growing in different regions. The main resource for phenology is Martin and Hutchensons, *A Flora of New Mexico,* which is not entirely complete and covers the entire state. Other sources for phenology data are from other states or from older (1970s) sources, so the true flowering times may differ in the sand dunes of Southeastern New Mexico. The best use for phenology is as a general guide to plant life events, such as whether a plant flowers in the spring or summer. The seasons correlated with the following months: Spring - March 1 to May 31; Summer - June 1 to August 31; Fall September 1 to November 30; and Winter - December 1 to February 28 or 29. These are the standard NOAA northern hemisphere meteorological seasons, but because of the local climate and geography of the CFO they are experienced much differently than in a temperate climate zone.

Habitat

Habitats descriptions are approximate; plants can grow in what appears to be a sandy soil that actually has a clay horizon. Microclimate effects can be important in washes or under the canopy of large shrubs, so that plants that normally grow at higher elevations can subsist at lower elevations. Some plants are common in Chihuahuan Semi-Desert Scrub in the western part of the CFO region, but not in similar habitats in the eastern part of the CFO region.

Southwest Regional Gap Analysis Project (SWReGAP) plant communities are used as general guides to the most common areas where a species may be found. Unfortunately, it is impossible to completely describe the distribution and occurrence of each species across the entire CFO region. Although plant community descriptions are provided for each species, individual plant distributions never exactly match plant community distributions. The given habitats are based on the authors' experience and reported distributions, neither of which are complete and infallible. The best use for habitat information is as a general guide to the type of areas where a plant is common; it may grow in many other areas as well.

Uses

Plant uses are listed based on available references. In some cases, uses for similar species, or uses of the same species by Native American groups from nearby regions are described, but these peripheral uses are not the focus of this book. Traditional uses should not be attempted without more thorough training in the preparation steps required; many edible plants are toxic if the correct steps are not followed.

Ethnographic Coverage

There are over 500 native cultures in the Americas, all with a deep knowledge of plant use. The cultural uses of plants presented in this text are chosen based on the most local extant and most recent historical culture groups. In southeastern New Mexico this group is the Apache culture group. The ethnographic research and the coverage of Apache culture group plant use is rich and extensive, making it a natural inclusion and fit as a source of ethnographic analogy for the CFO area. When knowledge about plant use is not known for the Apache culture group, information from other groups will be included when appropriate.

Part I: Southeast New Mexico in Context

Vegetation of the Carlsbad Field Office: Classifications and Maps

David Lightfoot

The vegetation of the Carlsbad Field Office (CFO) in southeastern New Mexico (SEMN) is composed of assemblages of plants that grow together across different landscapes, environments and habitats. These assemblages of species are referred to as vegetation types, plant communities, or for this text ecoregions. Plant communities are characterized by observable co-dominant species that have similar environmental or habitat preferences. However, all plant species have their own specific environmental requirements and geographic distributions, and assemblages of species are the result of consistent geographic and environmental overlap among individual species distributions. Specific landscapes with particular environments (geology, soils, and climate) tend to support communities of species with similar environmental preferences. Some of the species in a given plant community are environmental generalists that occur over a broader range of environments and are members of other plant communities, while others tend to be more specific to particular soils, water availability, microclimate or other factors and are restricted to certain areas. Plant community classification across landscapes provides a useful tool for characterizing and managing various landscape units, since plant communities reflect underlying environmental similarities, and differ from surrounding plant communities and their environments.

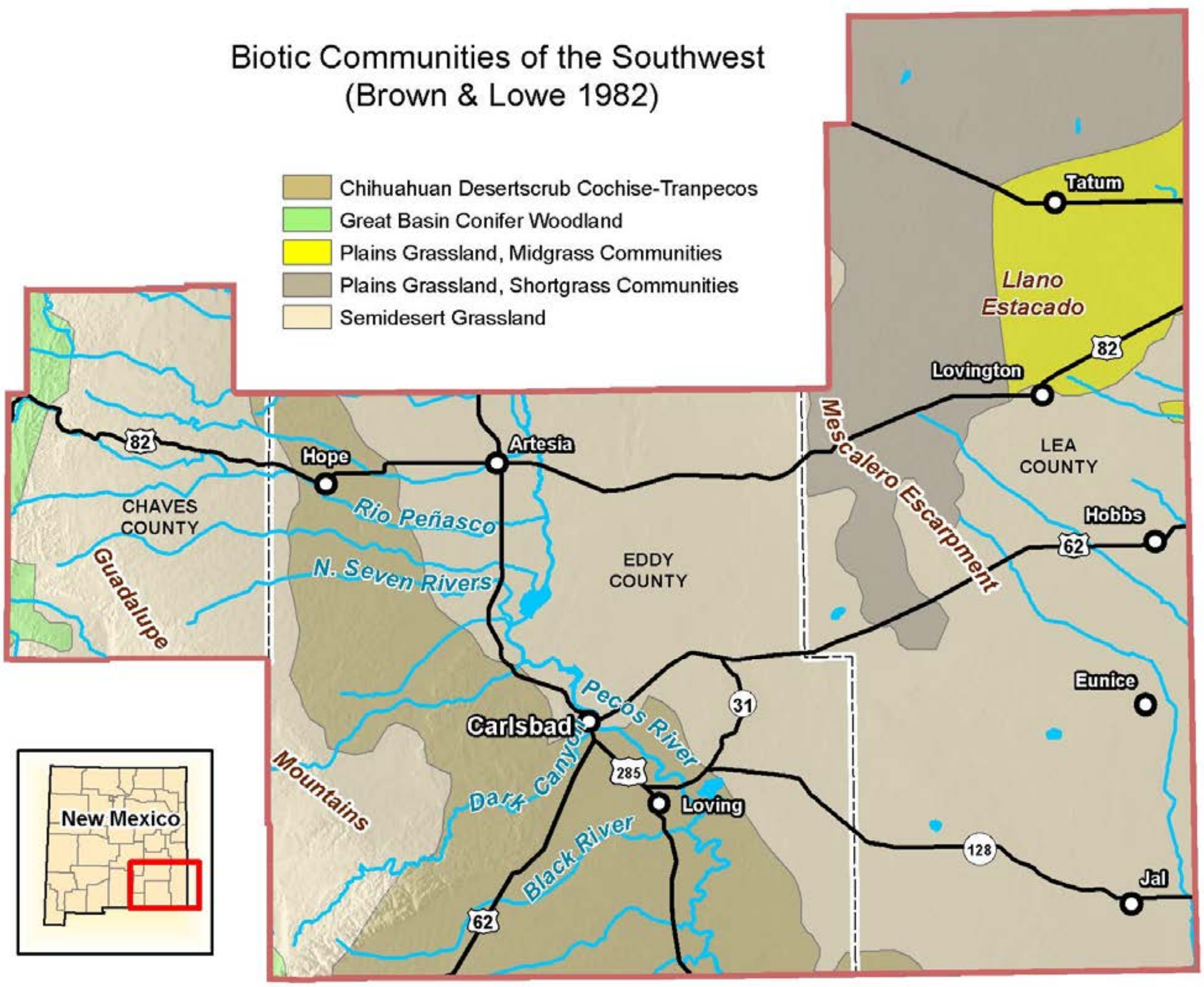


Figure 2. Brown and Lowe's (1982) general Southwestern biotic communities for the CFO.

Human populations in the past and the present recognize these plant communities, and predictable activities both in time and space, focusing on plant resources, have been documented in the modern era.

There are numerous plant community classifications for the CFO, including large and small scale spatial ecoregions (Omernik 1987; US Environmental Protection Agency 2015) and land resource regions (Major Landscape Resource Areas [MRLA], USDA NRCS 2006), finer landscape-scale biotic communities (Bailey 1994; Brown 1982; Brown and Lowe 1982; Brown et al. 2007), land cover types based primarily on vegetation cover (Lowry et al. 2005), and vegetation community types (Dick-Peddie 1993). Each of these classifications and associated maps emphasize different environmental features and were developed for specific resource management goals relative to plant species communities across landscapes. Ecoregions and MLRAs consider not only the geographic distributions of flora and fauna, but also abiotic environments and landscape ecosystem processes. Biotic communities focus on the geographic distributions of both plant and animal species across landscapes, while plant communities focus primarily just on the geographic distributions of vegetation types or plant species across landscapes. Ecoregion and MLRA classifications and maps are hierarchical, grouping finer levels or partitions of spatial resolution into maps of larger- or coarser-scale resolution, such as Level I, Level II, and Level III ecoregion categories (Omernik 1987; USEPA 2015, USDA NRCS 2006). Hierarchical maps of landscape vegetation are useful for both broad-scale and fine-scale map needs.

Classifications that focus on vegetation are the most appropriate for this guide, including the vegetation map of New Mexico presented by Dick-Peddie (1993),

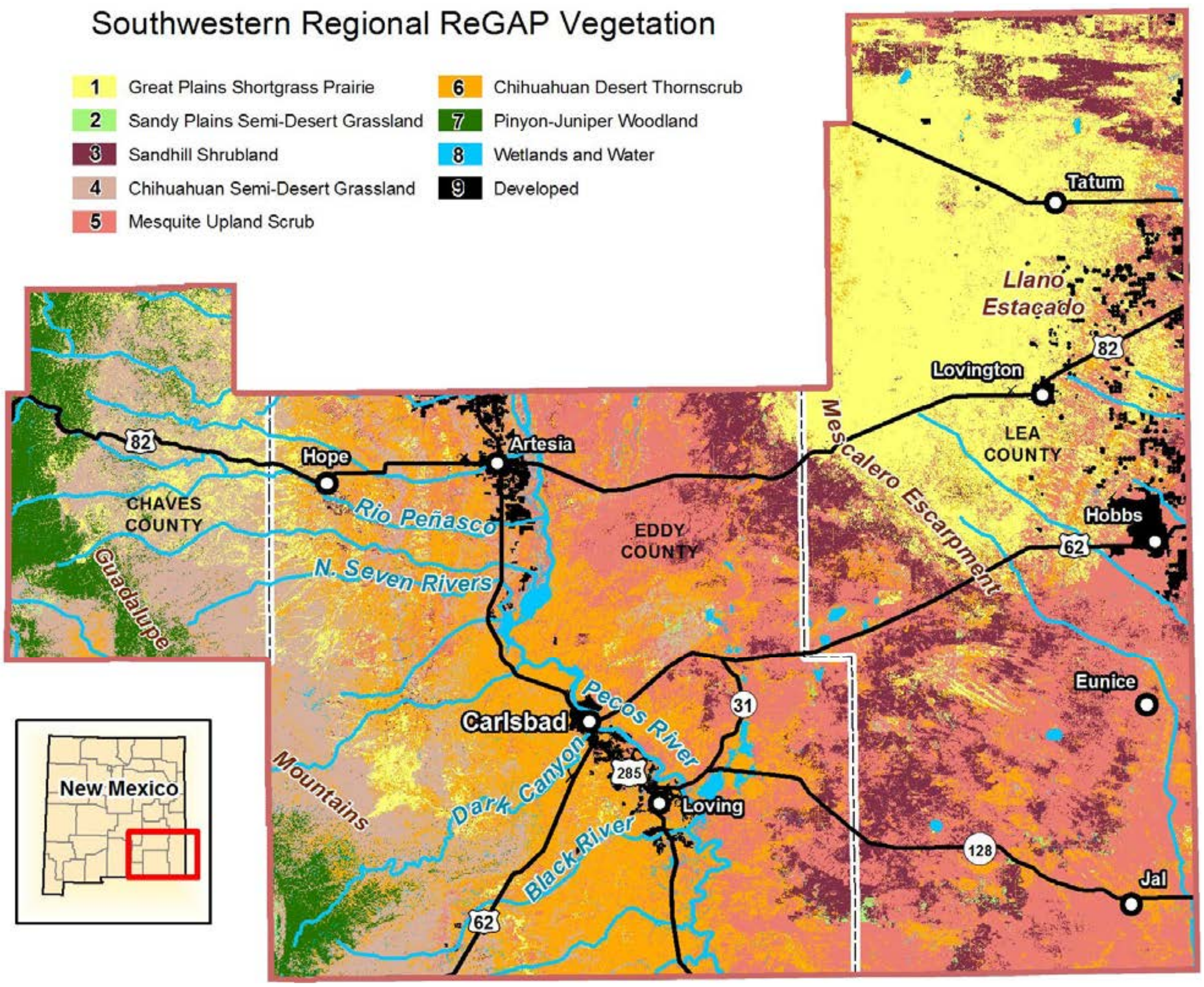


Figure 3. Simplified classification of the Southwestern Region ReGAP Vegetation model for the CFO region.

biotic communities of the Southwest by Brown (1982) and Brown and Lowe (1982), and biotic communities of North America by Brown et al. 2007, and Southwest Regional Gap Analysis Project (SWReGAP) land cover types produced by the US Geological Survey and a cooperative consortium of academic institutions (Lowry et al. 2005). Dick-Peddie (1993) presents a generalized broad-scale natural vegetation map for the entire state of New Mexico, along with detailed descriptions of the vegetation and the environments that correspond to the map. The book by Dick-Peddie provides excellent detailed and useful descriptions of New Mexico vegetation community types and plant species, and should be referred to regardless of what map one uses. Brown and Lowe's (1982) Biotic Communities of the Southwest is based largely on vegetation patterns and plant communities, and provides good information on the different biotic community types as well as access to an electronic version of the map through the Arizona chapter of the Nature Conservancy (The Nature Conservancy, Arizona 2004). A map of Brown and Lowe's general Southwestern biotic communities for the CFO is presented in Figure 2 , and users can refer to the publication by Brown (1982) for information about the different community types. We recommend that users of this guide refer to both Dick-Peddie (1993) and Brown (1982), Brown and Lowe (1982), and Brown et al. (2007) for information on the vegetation presented in maps of broad-scale plant communities of the region.

Based on the classification of Brown (1982) and the map of Brown and Lowe (1982) and Brown et al. (2007), the areas of the CFO along the Pecos River basin are composed largely of the Warm Temperate Desert, Trans-Pecos Subdivision of Chihuahuan Desertscrub, characterized by creosote bush (*Larrea tridentata*), honey mesquite (*Prosopis glandulosa*), tarbush (*Flourensia cernua*), whitethorn acacia (*Acacia constricta*), catclaw acacia (*Acacia greggii*), mariola (*Parthenium incanum*), ocotillo (*Fouquieria splendens*), zinnias (*Zinnia* spp.), dogweeds (*Thymophylla* spp.), ratany (*Krameria*), condalias (*Condalia* spp.), yuccas (*Yucca* spp.), lechuguilla (*Agave lechuguilla*), many species of cacti, grasses, annual forbs, and many others. Other low-elevation areas of the CFO are composed of Warm Temperate Semidesert Grassland, characterized largely of grama (*Bouteloua* spp.), sacaton (*Sporobolus* spp.), tobosa (*Pleuraphis mutica*), threeawn (*Aristida* spp.), burrograss (*Scleropogon brevifolius*), and muhly (*Muhlenbergia* spp.) grasses, Mormon tea (*Ephedra* spp.), broom snakeweed (*Gutierrezia sarothrae*), yuccas, honey mesquite, and many cacti. Some areas of both the desertscrub and

Why Talk about Classifications and Maps?

The basis for this reference guide is a bounded land-scape for the Carlsbad Field Office in SENM, across which contiguous ecological zones are distributed. This text will present a course (Brown and Lowe 1982) and fine grain classification system (Southwestern ReGAP 2007), and these will be referred to though out the text. The ReGAP data will be used to define ecozones, and plants will be associated with those ecozones. However the ecozones are not clear boundaries on the landscape, and change through time. The 2007 dataset is our best source for vegeta-tion mapping in SENM.

Figure 4. The Mescalero Plain as seen from Maroon Cliffs in the CFO region

semidesert grasslands are on chemically and/or physically unique soils such as saline drainage depressions, gypsum outcrops, and sand dunes. Each of those unique environments supports a specialized assemblage of plant species, including local endemic and rare species. Other important subunits of vegetation within the desertscrub and semidesert grassland are riparian zones along rivers and streams, and shinoak (*Quercus havardii*) (also called shinnery oak) stands on sand dunes associated with the Mescalero sands. The riparian vegetation along the Pecos and Black River drainages are characterized by native Fremont cottonwood (Populus *fremonti*) and willows (*Salix* spp.), along with the now dominant but exotic invasive saltcedar (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*), along with many native and exotic understory shrubs, grasses, sedges and forbs. The shinoak stands of the Mescalero sands are characterized by shinoak, fourwing saltbush (*Atriplex canescens*), sacaton grasses (*Sporobolus* spp.), and many forbs and other grasses, all of which stabilize otherwise dynamic dunes. See Dick-Peddie (1993) for detailed information on the vegetation of these smaller but important subunits of the CFO's lowland vegetation.

The mid-elevations of the lower slopes of the Sacramento Mountains and the Guadalupe Mountains are composed of Cold Temperate Great Basin Conifer Woodland, characterized by pinyon-juniper woodlands. Dominant species include Rocky Mountain pinyon (*Pinus edulis*), one-seed juniper (*Juniperus monosperma*), alligator juniper (*Juniperus deppeana*), oaks (*Quercus* spp.), understory shrubs, grasses, forbs, yuccas, and cacti. In the Guadalupe Mountains there is a small zone of Coahuilan Interior Chaparral between the desertscrub and conifer woodlands, characterized by woody shrubs including several species of shrub oaks, silktassel (*Garrya wrightii* and *G. obovata*), mountain mahogany (*Cercocarpus breviflorus*), ceanothus (*Ceanothus greggii*), manzanita (*Arctostaphylos pungens*), skunkbush (*Rhus trilobatus* and *R. choriophylla*), madrone (*Arbutus texana*), sages (*Salvia* spp.), other shrubs, cacti, and sparse grasses and forbs. The regional vegetation types classified and mapped by Dick-Peddie (1993) (Chihuahuan Desert Scrub, Desert Grassland, Plains-Mesa Grassland, Plains-Mesa Sand Scrub, Juniper Savanna, Montane Scrub, and Coniferous Mixed-Woodlands) correspond closely to these same biotic communities of Brown (1982), and the reader should refer to both sources for detailed descriptive information on the vegetation of these landscape-scale vegetation community types.

For finer-spatial scale, high-resolution vegetation maps of the CFO, we recommend that users refer to SWReGAP maps and map unit descriptions (Lowry et al. 2005). SWReGAP maps and land cover descriptions are used in this guide relative to the distributions of individual plant species presented in this text. The acronym SWReGAP comes from the full name **S**outh**w**est **Re**gional **G**ap **A**nalysis **P**roject. Gap analysis was first developed in the 1980s as a mapping process to determine gaps in geographic landscape biodiversity information by mapping existing spatial information, noting the information gaps and then acquiring needed information to fill the gaps. SWReGAP was designed to provide gap analysis for the entire Southwest, and mapping is based on interpretation of aerial photographic image reflectance patterns, which differ across different types of vegetation cover. Random locations for each reflectance cover type also were visited to verify actual plant species compositions. SWReGAP mapping is not hierarchical; all maps are of the highest level or resolution (finest spatial scale) only, which are 30 m by 30 m pixels on the landscape. SWReGAP maps are available online, and there is an online interactive map (SWReGAP 2015a) that allows users to zoom in to any location in the Southwest, including the region, to view mapped land cover types, based largely on vegetation or plant communities. SWReGAP also provides online descriptions of the environments and the dominant plant species of each land cover type (SWReGAP 2015b). We chose SWReGAP as the vegetation mapping classification for this guide because of the high resolution maps and the availability of online user resources. Figure 3 is a SWReGAP map providing an overview of the vegetation types or communities across the CFO. Descriptions of each of the land cover or vegetation types that appears on the map are presented in the next chapter.

Introduction to Carlsbad Field Office Vegetation Communities

Conor Flynn

Across the BLM Carlsbad Field Office (CFO) region the SWReGAP mapping project has identified eight major vegetation communities (Figure 3 on preceding page). These communities span the far southwestern edge of the Great Plains as they grade into the desert of the Southwest. The Pecos River marks the approximate eastern boundary of the Chihuahuan Desert, although many typical desert plant species continue to occur sporadically on the rocky limestone hills east of the river. The Guadalupe and Sacramento Mountains and their foothills to the west create cooler and wetter conditions that support shrublands, woodlands, and forests with montane characteristics. Lower elevations along river channels, in addition to supporting distinct herbaceous, shrub, and forested wetlands, expose geologic strata such as gypsum in the surrounding uplands. Throughout the CFO, soil texture differences create visible vegetation patterns, including clay playas, sandy dunes, rocky escarpments, and silty grasslands.

Upland Vegetation Overview

The northern part of the CFO region includes the Southwestern limit of the vast flat plains and prairies of the **Great** Plains **Shortgrass Prairie—**dominated by sod-forming blue grama grass. In the central part of the CFO region lie the sandy plains and sand dunes of the **Sandy Plains Semi-Desert Grassland** and the **Sandhill Shrublands**. These areas are defined by an increasing gradient of sand, from mesa dropseed (*Sporobolus flexuosus*) sandy plains to full parabolic sand dunes capped with shinnery oak (*Quercus havardii*) and sand sage (*Artemisia filifolia*). **Chihuahuan Semi-Desert Grasslands** are another semi-desert grassland community that occurs on rocky or clay soils rather than sandy soils. Unfortunately much of this fragile semi-desert grassland has been replaced with perhaps the most ubiquitous plant species in the region, mesquite.

Grasslands in general have been subject to shrub encroachment in historical times. Both Great Plains and Chihuahuan desert grasslands now have more shrub cover as native grasses decline due to drought and overgrazing. Mesquite (*Prosopis glandulosa*) can invade and become a component in almost any plant community in the region, but in places where grasslands have been entirely converted to mesquite shrublands the new plant community is called **Mesquite Upland Scrub**. There is also a native Chihuahuan desert thornscrub community, the **Chihuahuan Desert Thornscrub**, which can contain almost pure stands of creosote (*Larrea tridentata*) in rocky flats but can also contain a diverse mix of shrubs on slopes that are too dry and rocky for mesquite. These shrubs often include javelina bush (*Condalia ericoides*), featherplume (*Dalea formosa*), whitethorn and catclaw acacia (*Acacia constricta* and *A. greggii*), as well as many species of succulent shrubs and cacti.

Lowland Vegetation Overview

Several of the lowland and wetland communities are combined on the accompanying map because the individual communities are not visible at the scale of the map; these communities make up a tiny fraction of the CFO. Wetlands and lowland communities are uncommon in the region, but dry washes and swales in the **Warm Desert Wash** plant community form important habitat for a variety of species. **Playa lakes** also occur but are usually unvegetated, with salt-tolerant vegetation around the rim. These "lakes" usually only hold water for short periods of time. Stock tanks and reservoirs are some of the only perennial water bodies in the region, and they often support wetland vegetation at their margins. The Pecos River, Black River, and Delaware rivers are the major perennial rivers in the area, and each supports a distinct **Riparian Woodland** community dominated by saltcedar (*Tamarix chinensis*) and common reed (*Phragmites australis*), with the occasional cattail. Cottonwood (*Populus deltoides*) and willow (*Salix exigua*) also occur but are now less frequent due to

Plant Communities and Understanding the Archaeological Record.

The archaeological record is situated in modern plant communities, and we currently believe that an understanding of those plant communities is vital to understanding any archaeological site. The modern plant communities presented in this reference guide will allow the user to identify the most appropriate plant community they may be located in while in the field, or when looking at maps with archaeological sites plotted. The modern distribution and composition of the communities given in this reference are not entirely accurate representation of what plant communities were like in the past. We will never be able to undo the ecological changes that have come about by modern use of the landscape and modern climate change. Therefore it cannot be understated that the landscape as we see it today, is most certainly not the landscape prehistoric people saw in the past, or even in the last century.

hydrologic alterations to the river such as dams, diversions, and lowered water tables.

Due to the rarity of wetlands in the CFO region, this book only covers a few representative species from each group of wetland plants, including grasses such as vine mesquite (*Panicum obtusum*), rushes such as arctic rush (*Juncus arcticus*), sedges such as yellow nutsedge (*Cyperus esculentus*) and common spikerush (*Eleocharis palustris*), and other wetland plants such as horsetails (*Equisetum hyemale*) and cattails (*Typha latifolia* and *Typha angustifolia*).

Upland Communities

(7) Pinyon-Juniper (PJ) woodland

PJ woodlands occur in the Guadalupe foothills and mountains on the western edge of the CFO in Chaves county. A few ponderosa trees do occur here, and the mountains beyond eventually reach heights that support truly montane species like aspen and fir. While these higher elevations would have been especially important to prehistoric native peoples, they are not the focus of this book. At the lower elevations, pinyon (*Pinus edulis*) and juniper (*Juniperus monosperma, J. deppeana, and J. pinchotii*) woodlands thin out until Chihuahuan Semi-Desert Grassland or Great Plains Shortgrass Prairie becomes continuous. Blue grama (Bouteloua gracilis) is the common understory grass throughout this transition zone. During historical times stands of juniper have invaded grasslands, in some cases transforming grasslands into forests. In PJ woodland communities on steep hillsides, Gambel oak (Quercus gambellii) can form continuous stands, and other shrubs like Three-leaf sumac (*Rhus trilobata*), Four-wing saltbush (*Atriplex canescens*) and Red barberry (*Berberis haematocarpa*) are also common.

(1) Great Plains Shortgrass Prairie

The prairies of the southern Great Plains are also called the Llano Estacado, a region where vast flat to rolling uplands are covered with blue grama grass. In addition to the ubiquitous blue grama grass (*Bouteloua gracilis*), a diverse mix of other grasses are often present, including threeawns (*Aristida* sp.), buffalograss (*Bouteloua dactyloides*), needle and thread grass (*Hesperostipa comata*), tabosagrass (*Pleuraphis mutica*), and sand dropseed (*Sporobolus cryptandrus*).

Perennial subshrubs often include Fendler's bladderpod (*Lesquerella fendleri*), broom snakeweed (*Gutierrezia sarothrae*), scarlet globemallow (*Sphaeralcea coccinea*), plains blackfoot (*Melampodium leucanthum*), and Rocky Mountain zinnia (*Zinnia grandiflora*).

Great Plains Shortgrass Prairies differ from Chihuahuan Semi-Desert grasslands based primarily on the dominant presence of sod-forming short grasses such as blue grama. Also, shrubs are much less common in shortgrass prairies than in semi-desert grasslands. However, sandier soils can have quite thick stands of soaptree yucca (*Yucca elata*) and taller grasses such as little bluestem (*Schizachrium scoparium*) and big bluestem (*Andropogon gerardii*) Certain shrubs, especially tree cholla (*Cylindropuntia imbricata*), juniper (*Juniperus monosperma*), and broom snakeweed (*Gutierrezia sarothrae*) can increase through over-grazing, and fourwing saltbush (*Atriplex canescens*) can increase when areas are not burned or grazed. Great Plains Shortgrass Prairies in the north are more resilient to grazing than Chihuahuan semi-desert grasslands and shrubs rarely invade the former as extensively and thickly as they do the latter. South of Hobbs, Great Plains Shortgrass Prairies blend into Mesquite Uplands or Chihuahuan Semi-Desert Grasslands, while at higher elevations the Prairies blend into PJ woodlands.

(4) Chihuahuan Semi-Desert Grassland

These desert grasslands grade from the shortgrass prairies to the north, through the plains around Carlsbad, into desert shrublands in the foothills of the Guadalupe Mountains. Bunchgrasses and characteristic Chihuahuan desert succulent shrubs and cacti distinguish this community from Great Plains Shortgrass Prairie. Finer-textured grassland soils and the presence of thick grasses distinguish this from Chihuahuan Desert Thornscrub.

Black grama (*Bouteloua eriopoda*) and tabosagrass (*Pleuraphis mutica*) are the diagnostic grass species found throughout this vegetation community. Areas supporting blue grama (*Bouteloua gracilis*) and New Mexico feathergrass (*Hesperostipa neomexicana*) are more common to the north as this plant community grades into the Great Plains Shortgrass Prairie. On steeper slopes a diverse mix of succulent shrubs and cacti can become dominant, including green sotol (*Dasylirion leiophyllum*) and mescal (*Agave parryi*) as a common codominant.

Found on gently sloping terrain and foothills of Guadalupe Mountains that supported frequent fire, this vegetation community is now rare east of the Pecos river, having been converted to Mesquite Upland Scrub through intensive grazing, drought, and disturbance.

An important sub-type of Chihuahuan Semi-Desert Grassland is found on gypsum outcrops near the Pecos river. These areas support distinctive low grasslands that can be sparsely or thickly vegetated with subshrub and shrubs. Species found here include gypsum-

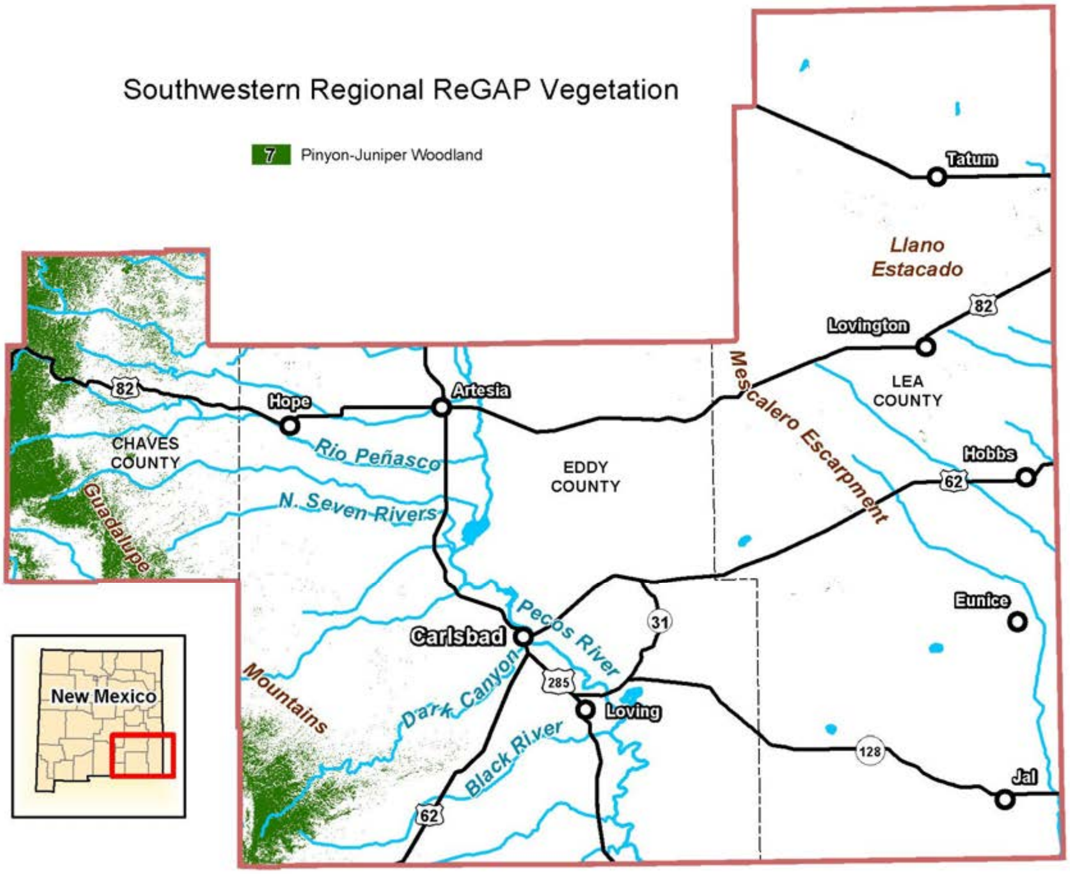


Figure 5: Distribution map of Pinyon-Juniper Woodland

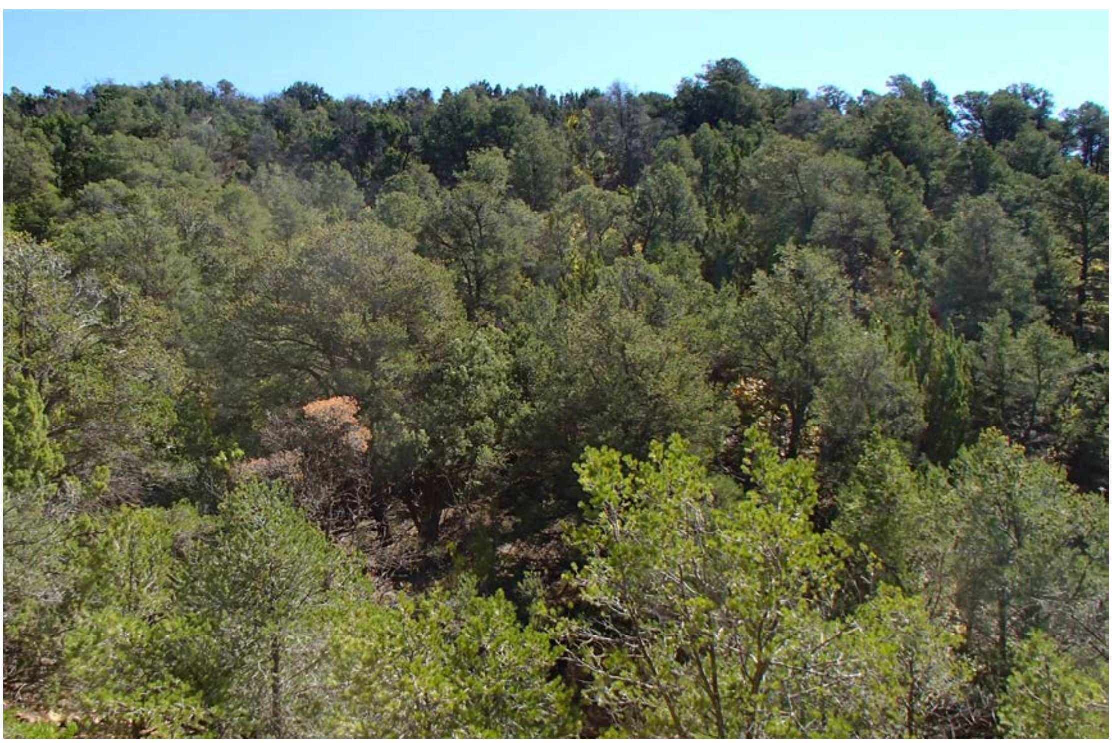


Figure 6: Pinyon-Juniper Woodland in the CFO region.

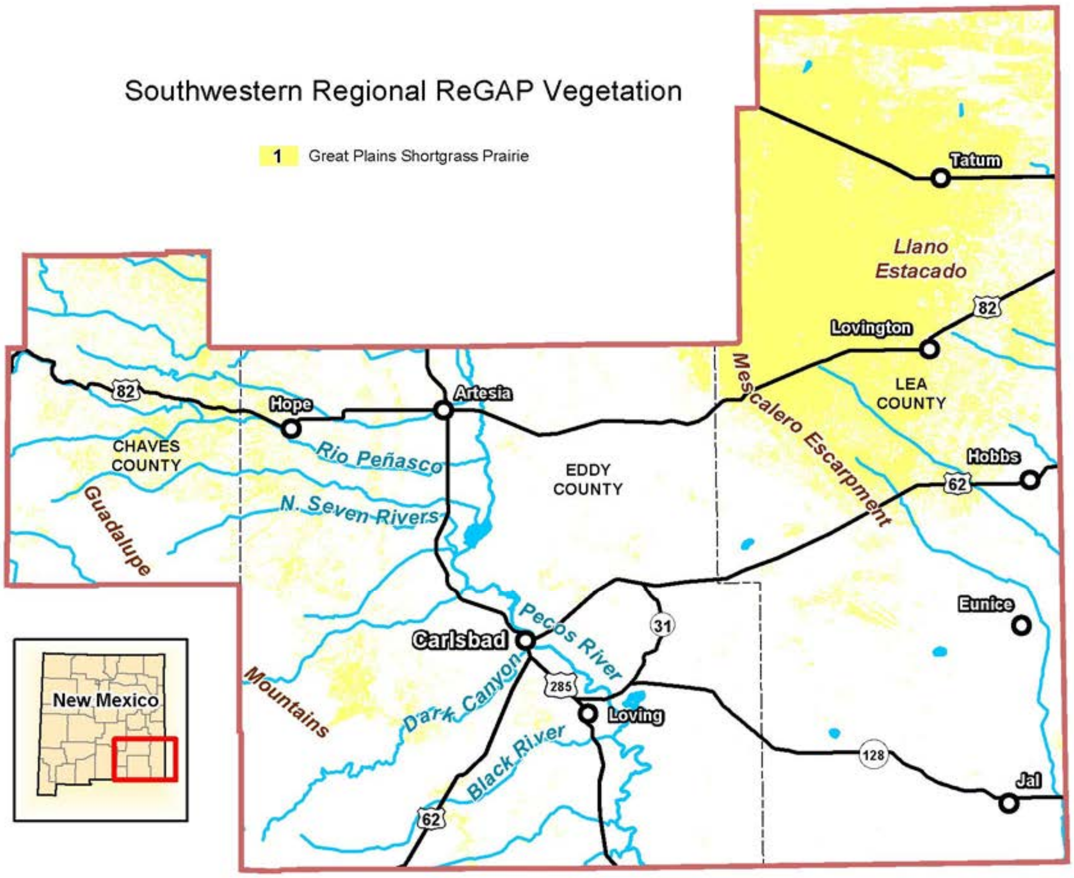


Figure 7. Distribution map of Great Plains Shortgrass Prairie

Figure 8. Great Plains Shortgrass Prairie. Blue grama is the dominant grass.

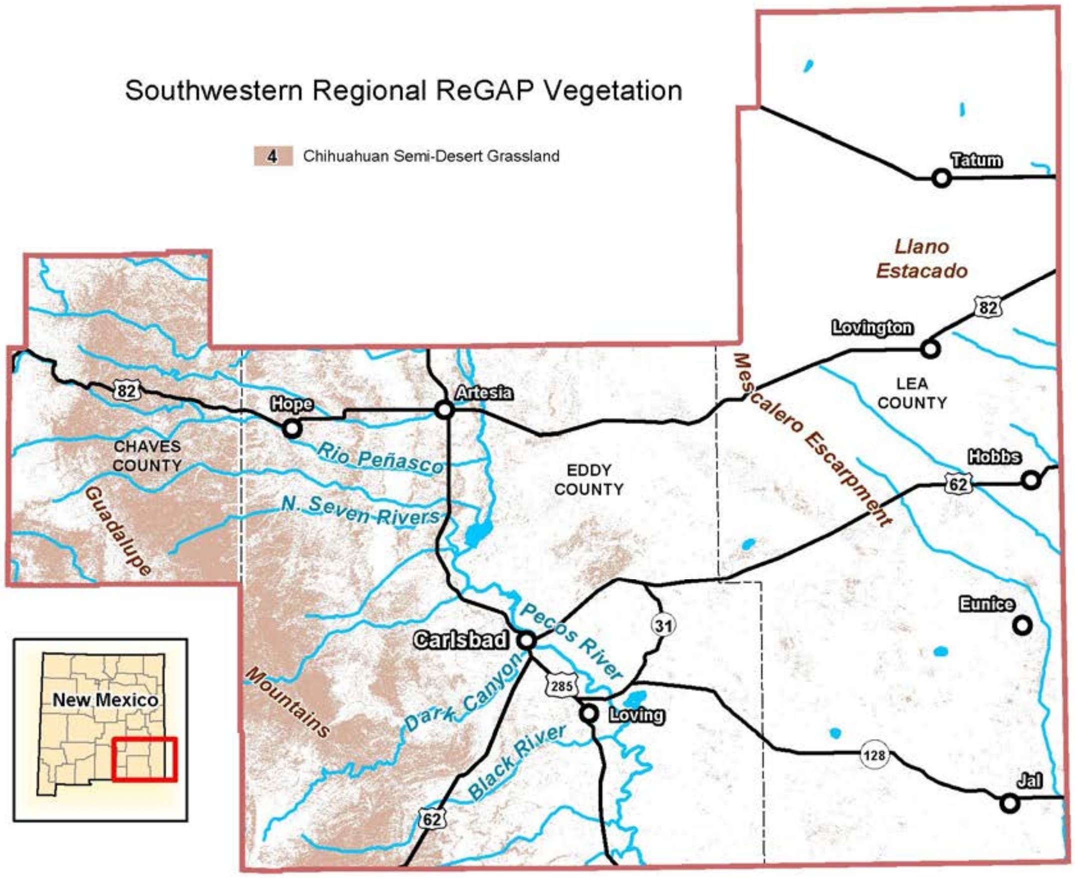


Figure 9. Distribution map of Chihuahuan Semi-Desert Grassland

Figure 10. Chihuahuan Semi-Desert Grassland

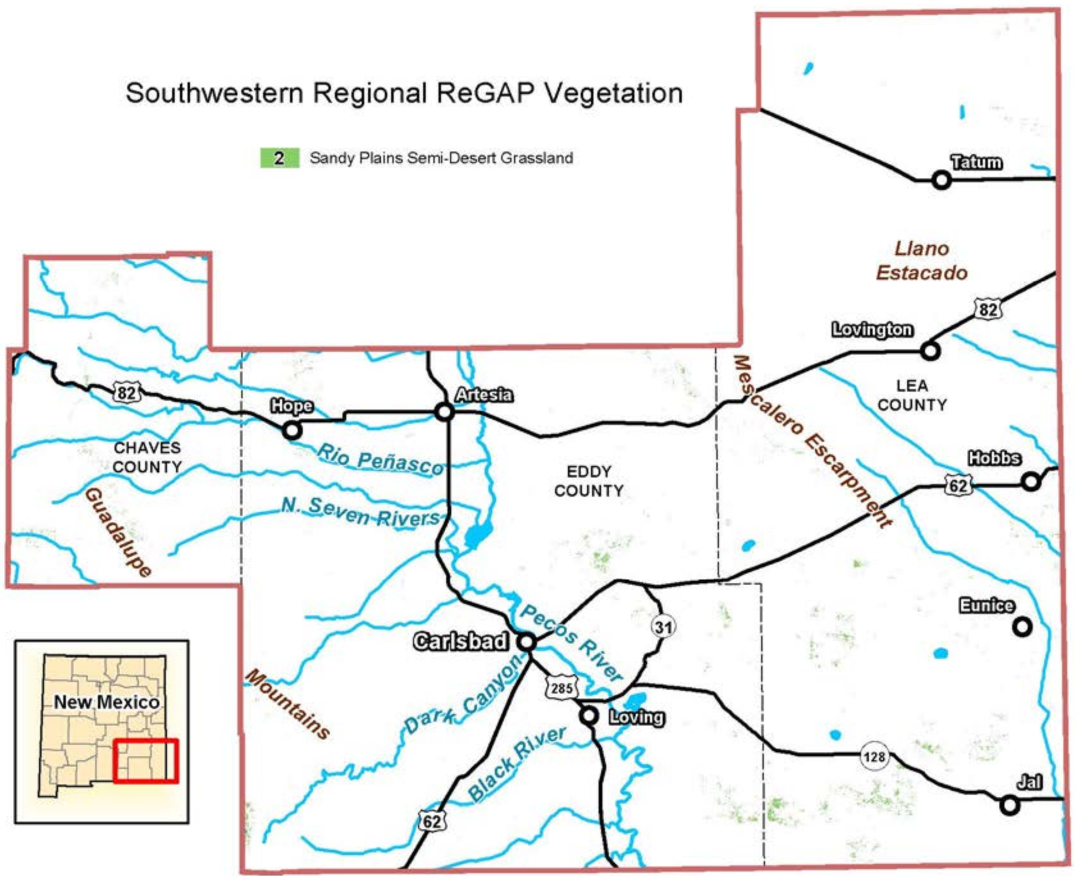


Figure 11. Distribution map of Sandy Plains Semi-Desert Grassland

Figure 12. A mesquite and Lehmann lovegrass-invaded Sandy Plains Semi-Desert Grassland. Appearing lush after heavy spring rains, the lovegrass is already flowering in the background, while disturbance-adapted native wildflowers (*Dimorphocarpa* and *Calylophus* and *Gaillardia*) bloom in the foreground.

specialists like *Tiquilia hispidissima, Bouteloua breviseta,* and well as more general species such as *Ephedra torreyana, Condalia ericoides, Poliomintha incana, Scleropogon brevifolius,* and *Sporobolus airoides.*

(2) Sandy Plains Semi-Desert Grassland

Sandy plains grasslands occur wherever soils have a high sand content, but are not deep or sandy enough to become dominated by shrubs such as shinnery oak (*Quercus havardii*) and sand sage (*Artemisia filifolia*). Grasses are dominant and can include Indian ricegrass (*Achnatherum hymenoides*) (but this species is now almost extirpated due to overgrazing), black grama (*Bouteloua eriopoda*), New Mexico feathergrass (*Hesperostipa neomexicana*), tabosagrass (*Pleuraphis mutica*), *Muhlenbergia arenicola, Aristida purpurea*, sand dropseed (*Sporobolus cryptandrus*), and especially mesa dropseed (*Sporobolus flexuosus*). Mesa dropseed is characteristic of sandy mesas and plains and can be easily spotted from nearby roads based on its tangled- and bent-over stalks.

Other plants can be diverse in this community, including shrubs such as Mormon tea (*Ephedra torreyana*), Catclaw Acacia (*Acacia greggii*), mesquite (*Prosopis glandulosa*), and plains yucca (*Yucca campestris*). Annual buckwheat (*Eriogonum annuum*) and spectacle pod (*Dimorphocarpa wislizeni*) are very common. Other species can include heliotrope (*Heliotropium convolvulaceum*), bractless blazingstar (*Mentzelia nuda*), evening primrose (*Oenothera caespitosa*), beeblossom (*Gaura villosa*), sundrops (*Calylophus serrulatus*),

This vegetation community is especially vulnerable to disturbance, and much of this area has probably been converted to Sandhill Shrubland or Mesquite Upland in historical times. *Also*, many of the native bunchgrass areas are now being invaded and replaced with sod-forming Lehmann Lovegrass (Eragrostis lehmannii).

(3) Sandhill Shrubland

Sandy plains and dunes are characterized by the presence of sand sage (*Artemisia filifolia*) because this plant relies on a *deep* layer of sandy soil to infiltrate and hold precipitation. In some areas a thick shinnery oak (*Quercus havardii*) shrub layer can develop, often associated with dune systems and/or very deep sandy soils.

Dunes can be classified as coppice, parabolic, or transverse. Coppice dunes (also sometimes called nabkhas or *hummocks*) formed during historical time through the erosion, transport, and deposition of sand around shrubs such as mesquite. Parabolic dunes are larger dunes that formed as blowouts and accumulations in a continuous sand sheet that is stabilized by shrubs such as shinnery oak. Transverse dunes are unvegetated, actively eroding features that occur in only a few isolated areas (e.g. near Maljamar) of the CFO. For more information about the geomorphology of the sandhills, see Hall and Goble (2006).

Mixed shinnery oak and bunchgrasses form the preferred habitat for the lesser prairie chicken while dune blow-outs form good habitat for dune sagebrush lizards. Shinnery oak *can* resprout after fires and intense grazing, but it is killed by herbicides, which are currently being used to kill shrubs and “restore” grasslands. Following herbiciding these areas are typically invaded by the invasive grass Lehmann lovegrass (*Eragrostis* lehmannii), which now forms extensive monocultures in former shrublands throughout the CFO region. In some disturbed sandy areas coastal sandbur (*Cenchrus spinifex*) can also form large colonies.

A range of robust bunchgrass species are distinctive to the Sandhill Shrublands, including giant dropseed (*Sporobolus giganteus*), giant sandreed (*Calamovilfa gigantea*), big *bluestem* (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), and cane bluestem (Bothriochloa *barbinoides*). Overgrazing can lead to a decrease in these large grasses. Sand dropseed (*Sporobolus cryptandrus*) was once much more common but has been largely replaced in the margins of the sandhills by the invasive grass Lehmann lovegrass (*Eragrostis lehmannii*).

Other shrubs may include plains yucca (*Yucca campestris*), mesquite (*Prosopis glandulosa*), and catclaw acacia (*Acacia greggii*). Common wildflowers are similar to those found in the adjacent Sandy Plains Semi-Desert Grassland. Annual buckwheat (*Eriogonum annuum*) is *perhaps* most common, often joined by a diverse mix of other forbs and wildflowers including heliotrope (*Heliotropium convolvulaceum*), bractless blazingstar (*Mentzelia nuda*), evening primrose (*Oenothera caespitosa*), beeblossom (*Gaura villosa*), sundrops (*Calylophus serrulatus*), and spectacle pod (*Dimorphocarpa wislizeni*).

(5) Mesquite Upland Scrub

Mesquite has spread throughout areas with deep silty soils and now forms the default vegetation community across much of the central and eastern CFO. Mesquite can also invade sandhills and desert washes and other coarse-textured soil areas. It is especially invasive in grasslands such as Sandy Plains *Semi*-Desert Grasslands, Great Plains Shortgrass Prairie, and Chihuahan Semi-Desert Grasslands.

This thorn scrub community is dominated by mesquite (*Prosopis glandulosa*). Mesquite may be the most

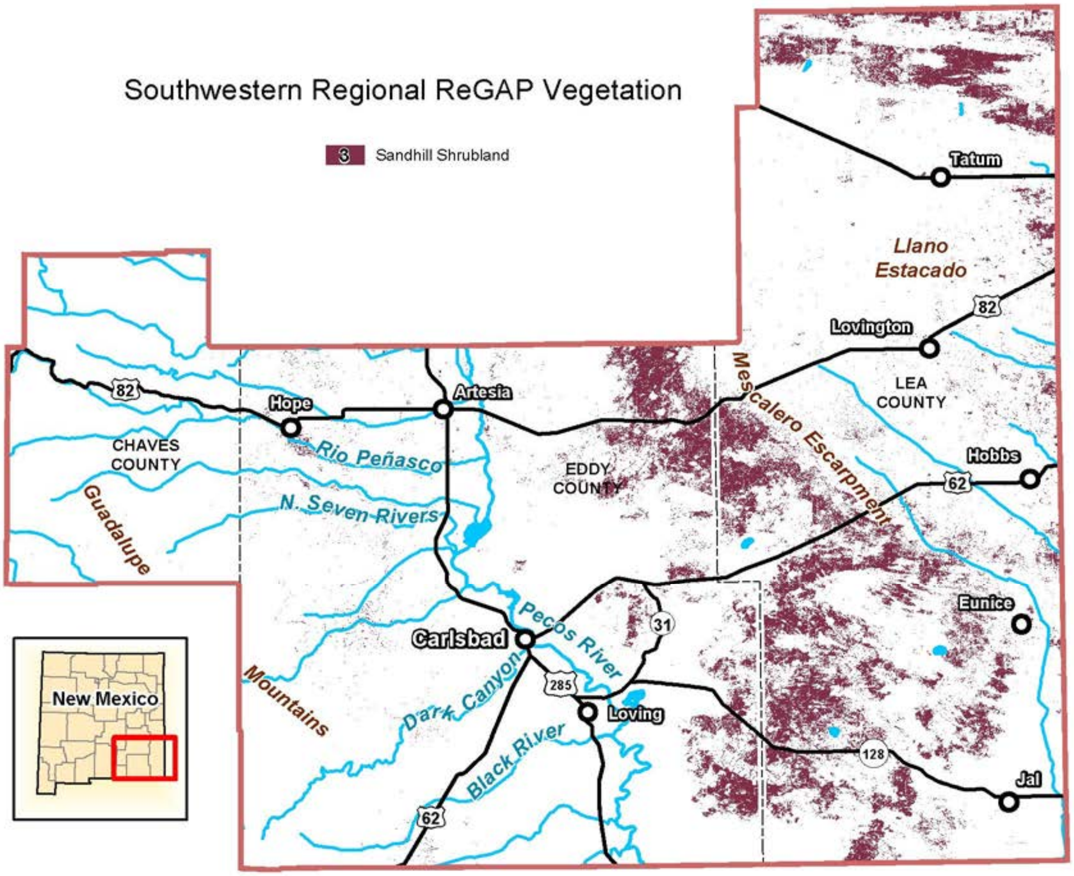


Figure 13. Distribution map of Sandhill Shrubland

Figure 14. Sandhill Shrubland

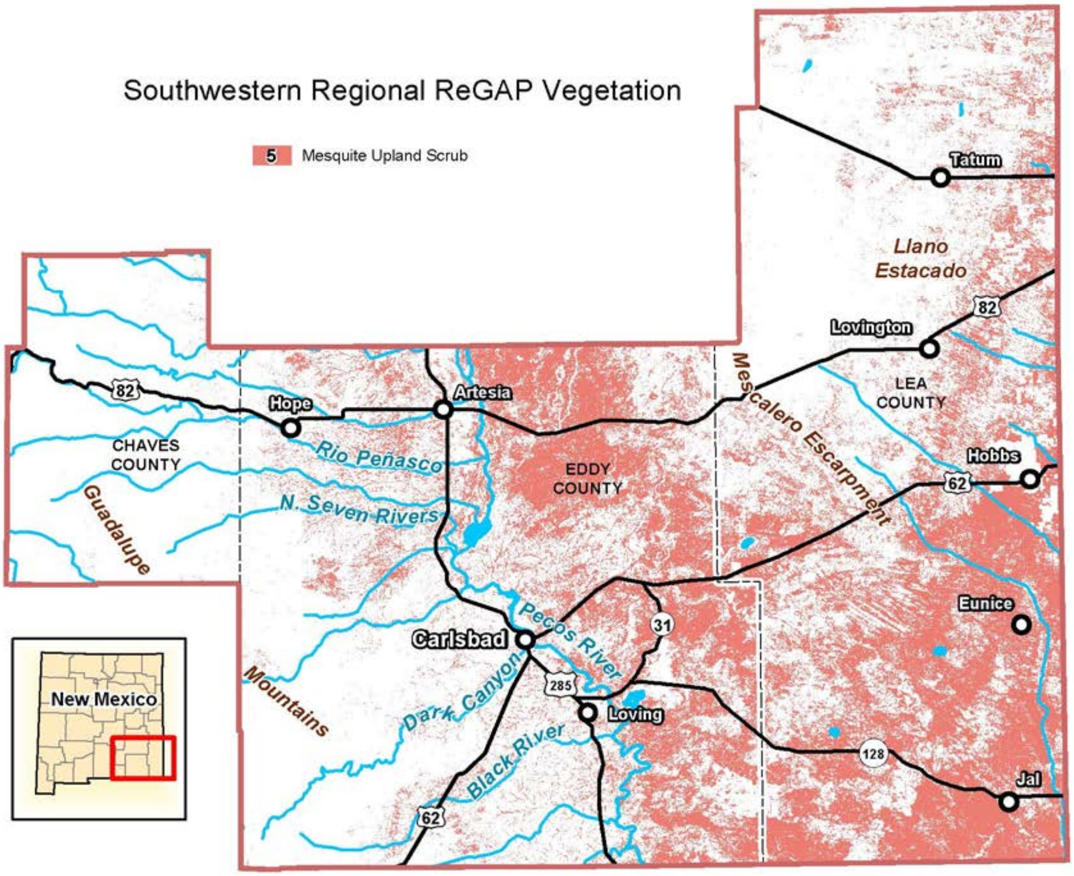


Figure 15. Distribution map of Mesquite Upland Scrub

Figure 16. Mesquite Upland Scrub showing low grass cover. Species present include mesquite (*Prosopis glandulosa*) and broom snakeweed (*Gutierrezia sarothrae*).

common plant in the CFO, found throughout the extensive grassland to shrubland transition from Guadalupe Mountain foothills in the west to the Edwards Plateau / Llano Estacado to the east.

Mesquite grows best when soils are deep, lacking the caliche or clay pan that would limit infiltration and storage of winter precipitation in deeper soils layers. Mesquite and other deep-rooted shrubs exploit the deep soil moisture that is unavailable to cacti or grasses. Rocky hillslopes, where any precipitation runs off quickly, are sometimes the only areas without mesquite. Common codominant species with mesquite include whitethorn acacia (*Acacia constricta*) in the central part of the region and one-seed juniper (*Juniperus monosperma*) to the north and west at higher elevations. Grass cover is typically low. During the last 150 years, the area occupied by mesquite thornscrub has increased at the expense of native grasslands because of a combination of drought, overgrazing, decreased fire frequency, and climate change.

Although there is typically more bare ground than vegetation, in years of good precipitation and light grazing, blue grama (*Bouteloua gracilis*), black grama (*Bouteloua* eriopoda), bush muhly (*Muhlenbergia porteri*), and mesa dropseed (*Sporobolus flexuosus*) can increase. Common wildflowers include milkweeds (*Asclepias subverticillata, A. asperula, A. latifolia*), flax (*Linum* sp.), Geyer's onion (*Allium drummondii*) forms large colonies, lazy daisy (*Aphanostephus riddellii*), and plantains (*Plantago patagonica*).

(6) Chihuahuan Desert Thornscrub

Thornscrub is the common native Chihuahuan desert vegetation that occurs throughout southern New Mexico south into West Texas. There are several different subtypes of this community dominated by various Chihuahuan endemic shrubs and succulents. Xeric creosote bush (*Larrea* tridentata) basins and plains cover vast areas of land in this region. These apparent monocultures can contain nothing but creosote and maybe some low woolly grass (*Dasyochloa pulchella*), or they can contain a mixture of desert shrubs and succulents such as green sotol (*Dasylirion leiophyllum*), tarbush (*Flourensia cernua*), mesquite (*Prosopis glandulosa*), and woody crinklemat (*Tiquilia canescens*). Stands of whitethorn acacia (*Acacia constricta*) or catclaw acacia (*Acacia greggii*) thornscrub can also occur over large areas, especially around the Quahada ridge near the junction of NM 31 and US 62/180. On rocky hillsides throughout the CFO region, javelina bush (*Condalia ericoides*) and featherplume (*Dalea formosa*) are common, along with many kinds of cacti such as devilshead (*Echinocactus horizonthalonius*) and spinystar (*Escobaria vivipara*).

Desert pavements consist of pebbles packed closely together and can form in areas where fine-textured topsoils have been eroded away. Playa boundaries can contain a distinct salt desert scrub-shrub vegetation, described below.

Grasses are infrequent but can also include black grama (*Bouteloua eriopoda*), bush muhly (*Muhlenbergia porteri*), and tabosagrass (*Pleuraphis mutica*), and burrograss (Scleropogon *brevifolius*). Most of these grasses quickly decrease with grazing, often leaving nothing between shrubs and succulents except bare ground. Cacti can be relatively common in this vegetation association, but wildflowers are not usually common. During wet years, species such as Dakota mock vervain (*Glandularia bipinnatifida*), flax (*Linum* sp.), and Hopi tea (*Thelesperma megapotamicum*) can cover large areas.

Lowland Communities

(8) Wetlands and Playas

Lowlands and wetlands are depicted on the map (Figure 2, above) as wetlands and water. Although the following lowland communities are not always wetlands, they do support a distinctive flora composed of species that require more water than the typical desert vegetation of the CFO.

Warm Desert Wash

This community includes both nonchannelized (swale) and channelized (wash) areas where run-on water supports water-loving plants. These areas collect run-off precipitation but they drain too quickly and are not wet long enough to form true wetlands.

Littleleaf sumac (*Rhus microphylla*) is a common and characteristic plant of the low-lying swales or washes that occur as strips within desert scrub- or desert grassland-dominated landscapes. Other varieties of this vegetation *community* include little walnut (*Juglans microcarpa*) shrublands, vine mesquite (*Panicum bulbosum*) temporarily flooded swales, and mesquite (*Prosopis glandulosa*) shrublands. In addition to vine mesquite, streambed bristlegrass (*Setaria leucopila*) is a common grass of these wetter areas. In drier areas, patches of soaptree (*Sapindus saponaria*) woodland occur around low-lying watering holes and stock tanks and can be important bird nesting areas in landscapes that typically lack trees.

Other shrub and tree species can include catclaw acacia (*Acacia greggii*), splitleaf brickelbush (*Brickellia laciniata*), desert *willow* (*Chilopsis linearis*), and Apache plume (*Fallugia paradoxa*—more common to the west in foothills and mountains). A weedy mix of forbs can grow in these plant communities, including Dakota mock vervain (*Glandularia bipinnatifida*), balloonbush (*Epixiphium wislizeni*), and stinging serpent (*Cevallia*

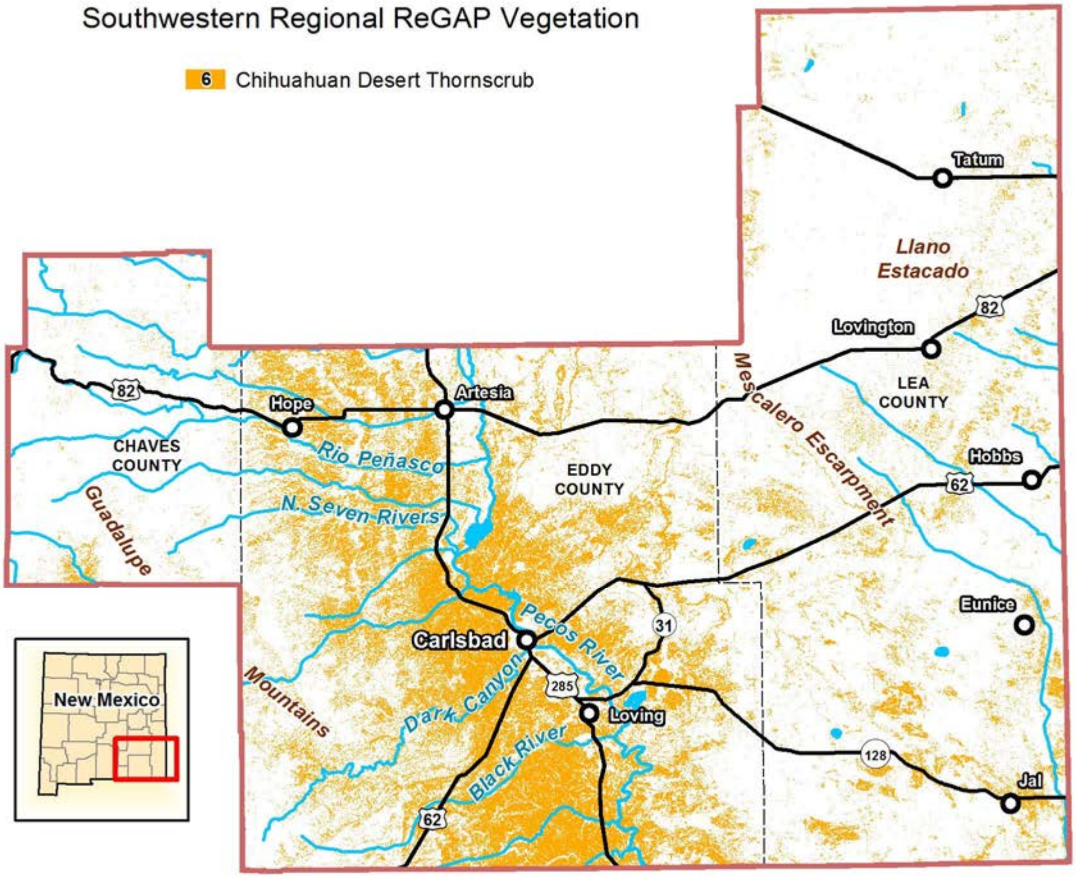


Figure 17. Distribution map of Chihuahuan Desert Thornscrub

Figure 18. Chihuahuan Desert Thornscrub

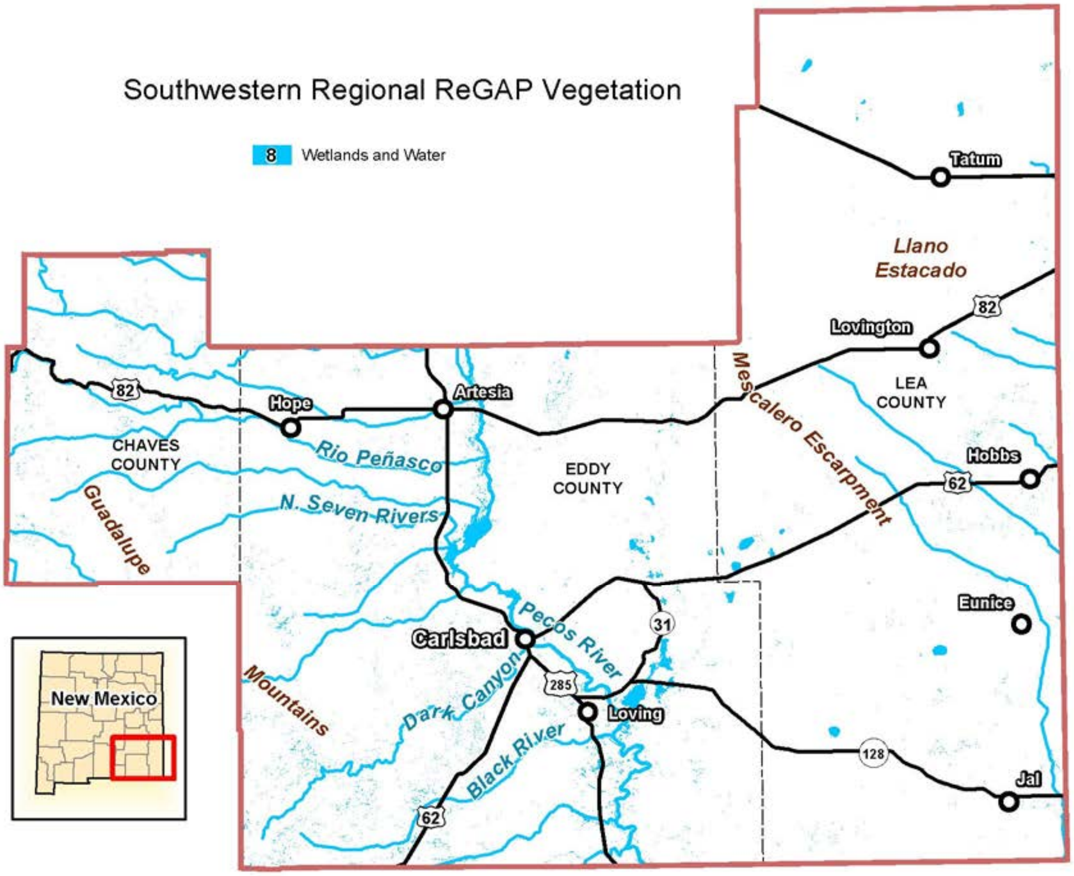


Figure 19. Distribution map of Wetlands and Water

Figure 20. Warm Desert Wash

Figure 21. Riparian Woodland and Scrubland

Figure 22. Playa—Mixed Salt Desert Scrub

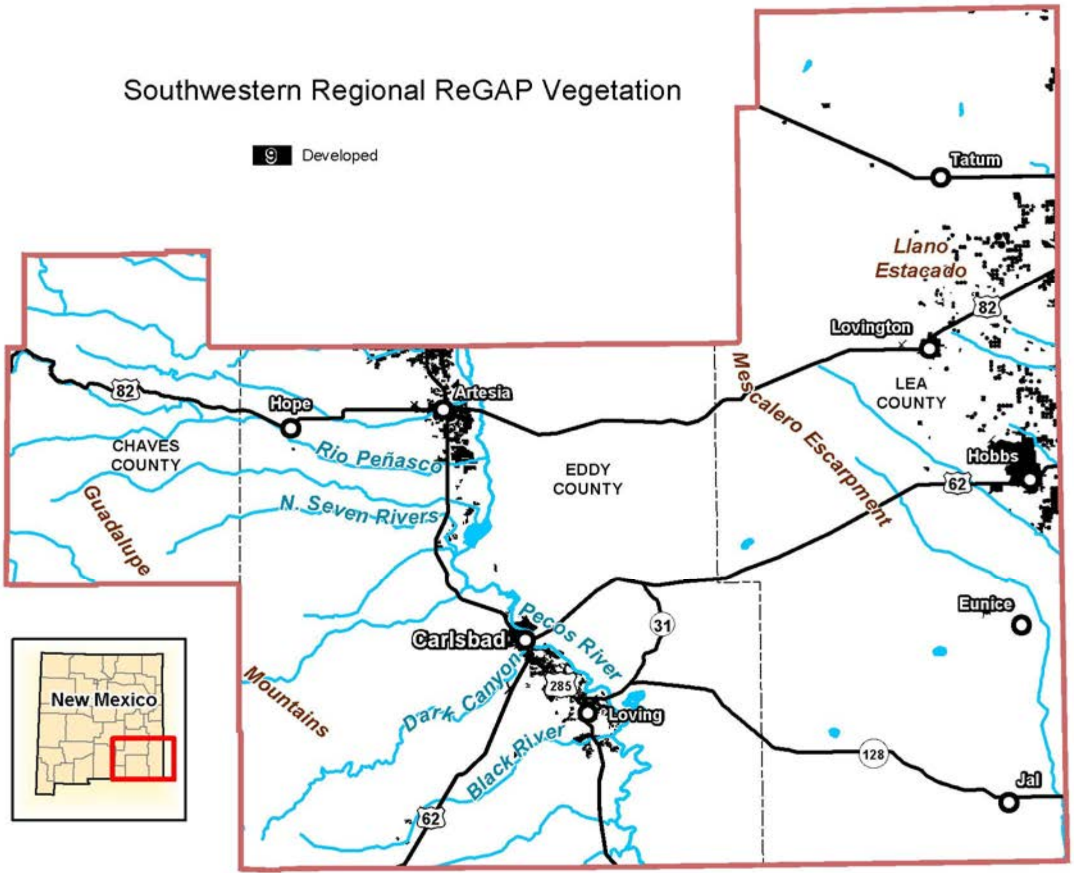


Figure 23. Distribution map of Disturbed Areas

Figure 24. A typical Disturbed Area in the CFO region

sinuata). Sandy washes can support mariola (*Parthenium incanum*) and Hopi tea (*Thelesperma megapotamicum*) along the edges.

Riparian Woodland and Shrubland

Riparian areas are found along perennial and perennial-intermittent creeks and rivers in the CFO region, most notably the Pecos, Black, and Delaware Rivers. These areas have been heavily impacted by development, agriculture, and invasive species. Cottonwood (*Populus deltoides*) and willow (*Salix exigua*) multi-layered forests would have occurred in the past, but are now almost extirpated due to hydrologic alterations such as dams and diversions. In their place, stream banks now support a community dominated by saltcedar (*Tamarix chinensis*), common reed (*Phragmites australis*), and cattails (*Typha latifolia* and *Typha angustifolia*). This community can include herbaceous wetlands and emergent marshes in areas of slow moving water. Stock tank fringes can also develop wetland vegetation.

Playa – Mixed Salt Desert Scrub

A playa is "a dry lake basin, without drainage, periodically filled with a sheet of water; the floor is smooth, barren, and sun-baked." (Allred, 2011). The term "playa" is derived from the Spanish word for a beach. Therefore, playas, strictly defined, are bare areas or "beaches" where inundation kills any perennial plant. They may be sparsely vegetated by annual plants in-between periods of inundation.

Playas can occur wherever water pools and then evaporates for extended periods of time. Low-lying depressions often contain fine-textured soils that slow the rate that precipitation sinks into the soil. As a result, evaporation is important, often leaving a salt crust behind once the water is gone. Playas sometimes have shallow water tables, although the water table depth fluctuates too much to support true wetland communities.

Vegetation types can include grasslands, shrublands, and bare ground. Saltgrass (*Distichlis spicata*) and Alkali sacaton (*Sporobolus airoides*) grasslands form monocultures on better-drained depressions, whereas true playa lakes are generally devoid of vegetation. Around the edges of these closed depressions, salt-tolerant shrubs such as Iodinebush (Allenrolfea), southern goldenbush (*Isocoma pluriflora*) and fourwing saltbush (*Atriplex canescens*) can form extensive stands.

(9) Disturbed areas

Disturbed vegetation communities can include farmland and developed cities and industrial sites. The CFO region contains a complex mix of native-dominated and invasive-dominated plant communities and smaller disturbed areas can occur within any of the other described upland and wetland vegetation communities. Human-altered environments can support their own unique assemblage of plants; for example, some pastures and abandoned farm fields contain almost pure stands of Russian thistle (*Salsola tragus*), kochia (*Bassia scoparia*), and/or weedy mustards such as herb Sophia (*Descurainia sophia*). In disturbed natural environments, a diverse mix of annual wildflowers can appear, including spectacle pod (*Dimorphocarpa wislizeni*), woolly paperflower (*Psilostrophe tagetina*), Indian blanket (*Gaillardia pulchella*), evening primroses (*Oenothera* sp.), Hopi tea (*Thelesperma megapotamicum*), and sunflowers such as *Helianthus petiolaris* or *H. ciliaris.*

Overview of plant communities

The large amount of data available from vegetation mapping can be daunting to comprehend and use efficiently. A table of plant localities by our nine major ReGAP Vegetation areas are given in Appendix A and summarized below in Table 1. Most of the most common species can be found in multiple locations, which means that most can be found in more than one eco-zone in the CFO area, when they can be found at all. The specific zones for each plant are also given in the species treatments. The most diverse ecozones are the Chihuahuan Desert Thornscrub and Semi-Desert Grassland, both are in the Pecos River Valley, with many drainages and varied topography. The least diverse eco-zones are Great Plains Shortgrass Prairie and Sandy Plains Semi-Desert Grassland.

The phenology (the study of plant and animal life cycles) of our species is given in Appendix B, summarized below. There is some seasonality seen in flowering and fruiting timing, However some plant parts are available at all times of the year (such as wood and tubers).

Eco-Zone with % Area of CFO Region	Species
1. Great Plains Shortgrass Prairie—21.6%	25
2. Sandy Plains Semi-Desert Grassland—0.4%	35
3. Sandhill Shrubland—8.9%	27
4. Chihuahuan Semi-Desert Grassland—15.2%	61
5. Mesquite Upland Scrub—27.8%	50
6. Chihuahuan Desert Thornscrub—18.0	67
7. Pinyon-Juniper Woodland—4.7%	41
8. Wetlands and Swales—0.8%	49
9. Developed / Disturbed—2.5%	45

Table 1. Species by ecoregion in the CFO

Pre-Quaternary Environments and Vegetation

David Lightfoot

The terrestrial environments and flora of the CFO have been evolving since the region uplifted from the Panthalassic Ocean during the Triassic Period, approximately 250 to 200 million years ago (mya) at the end of the Paleozoic Era (~540-250 mya), (Table 2. see Blakey and Ranney 2008 for details on the Pre-Quaternary environments of the Southwest). During that time, North America was still part of the supercontinent Pangea and shared plant and animal species with the rest of the world. The climate of the region had begun to turn drier and the Permian mass extinction had just occurred (believed to have resulted from massive scale volcanism and catastrophic climate change), killing an estimated 90% of all life on earth. The Mesozoic Era was from 250-66 mya, and the Triassic Period marked the beginning of the age of reptiles, and the evolution and diversification of dinosaurs. The first terrestrial vegetation to occupy the uplifted region was dominated by gymnosperms (cone-bearing plants) including the now extinct cordaitales (ancestral conifers), along with ancestors of modern conifers, cycads, horsetails and seed ferns. During the following Jurassic Period (~200-145 mya), the region was a coastal plain and the climate drier. Dinosaurs continued to evolve and diversify. During the early Cretaceous Period (~145-66 mya), a shallow sea was present just south of the CFO, by the mid-Cretaceous the sea had shifted to the regions north of the CFO, and by the late Cretaceous the entire region was dry land with terrestrial environments that supported evolving and diversifying plants. Flowering plants or angiosperms first appeared about ~139 mya during the early-mid Cretaceous and rapidly evolved and diversified along with new lineages of insect pollinators. This was a significant event for the evolution of plants, when angiosperms largely replaced gymnosperms and evolved into the diverse floras of today. The Cretaceous ended abruptly with another mass extinction resulting from an asteroid impact, the KPg (also called the KT boundary ~66 mya) extinction that killed the dinosaurs and much of life on earth at the end of the Mesozoic Era.

The Cenozoic Era (~66 to the present) began following the KPg mass extinction with the Paleogene Period (~66-23 mya), also called the early Tertiary Period. The Paleogene (Paleocene ~66-56 mya, Eocene ~56-34 mya, and Oligocene ~34-23 mya epochs) landscapes were relatively level, not mountainous as they are today, with tropical to subtropical climates. The overall climate was warm and moist, and terrestrial environments were uniform due to the lack of topographic relief. Continental movement and volcanic activity resulted in landscape uplifting and mountain formation in western and central New Mexico, while the CFO remained a coastal plain. By the Neogene Period (~23-2.6 mya, also called late Tertiary Period),

Era	Period	Epoch	Approximate Age Cohen et *al.* 2013
Cenozoic	***Quaternary***	Holocene	11,7000 years to Present
		Pleistocene	2.5 mya-11,7000 years
	Neogene	Pliocene	5-2.5 mya
		Miocene	23-5 mya
	Paleogene	Oligocene	34-23 mya
		Eocene	56-34 mya
		Paleocene	66-56 mya
Mesozoic	***Cretaceous***		145-66 mya
	Jurassic		200-145 mya
	Triassic		250-200 mya
Paleozoic			540-250 mya

Table 2. Geologic eras mentioned in text.

all of eastern New Mexico was a terrestrial tropical plain. Following the extinction of dinosaurs, mammals rapidly evolved and diversified to become dominant vertebrates on earth through the Cenozonic, and North America had separated from the other continents and was now an isolated continent.

Three principal floras called geofloras occupied North America during the Paleogene (Axelrod 1983). New Mexico was dominated by the tropical Neotropical-Tertiary Geoflora with some elements of the Madro-Tertiary Geoflora which consisted of plant species that preferred drier environments (Axelrod 1983). The third Arcto-Tertiary Geoflora occurred in Northern North America and consisted of cool-temperate climate adapted plant species. Lowland areas of eastern New Mexico consisted of tropical forests while the uplifting montane areas of central and western New Mexico consisted of pine-oak forests. During the Eocene and Oligocene epochs of the late Paleogene, the entire region become cooler and drier, and the vegetation of New Mexico included conifer and deciduous woodlands, savanna, chaparral and thorn scrub vegetation types (Axelrod 1983). Mountain building in western and central New Mexico and across western North America continued through the Neogene Period, creating a rain shadow effect from Pacific moisture. The cooling and drying during the Miocene Epoch resulted in a southern retreat of the Neotropical-Tertiary Geoflora from New Mexico to Mexico, and an advancement of the Arcto-Tertiary Geoflora into New Mexico. That shift in continental floras resulted in the development of grasslands in eastern New Mexico, including many of the grass genera common in eastern New Mexico today (*Agropyron, Poa, Bouteloua, Pleuraphis*, *Stipa* and *Sporobolus*). The Sierra Nevada and Cascade ranges to the west lifted during the Neogene Period (Miocene and Pliocene epochs), creating an even stronger Pacific rain shadow and more arid environments in New Mexico. Sagebrush (*Artemisia tridentata*) is known to have first appeared in New Mexico during that time. By the beginning of the Quaternary Period, the environments and flora of New Mexico and the Permian Basin region had become dominated by elements of the arid-adapted Madro-Tertiary eoflora along with grassland elements of the Arcto- and Neotropical-Tertiary geofloras, while most elements of the mesophytic Neotropical-Tertiary Geoflora had retreated to the south.

Quaternary Environments and Vegetation

The Pleistocene Epoch

The late Cenozoic, Quaternary Period, is comprised of the Pleistocene (2.6 mya to 11,700 year ago) and Holocene epochs (11,700 years ago to the present). The Pleistocene Epoch was a time of ice ages when the world's climate was much cooler than today. Glaciers and ice sheets covered the arctic and northern temperate portions of North America, and there were considerable long-term fluctuations in global temperatures that resulted in repeated advancements and retreats of ice sheets and glaciers. As global temperatures fluctuated and ice sheets retreated and advanced from north to south, vegetation zones and individual species also retreated and advanced from north to south and up and down in elevation. The repeatedly fluctuating climate and geographic movement and isolation of plant species on mountain islands and desert basin islands apparently resulted in the evolution of many of the endemic plant species of the Chihuahuan Desert. Pollen deposited in lake beds (Martin and Mehringer 1965) and vegetation fragments in packrat middens (Betancourt et al. 1990) have allowed paleobotanists to determine the past vegetation compositions across New Mexico and the Permian Basin region as far back as about 40,000 ya, near end of the Pleistocene.

The last major glaciation event that affected SENM was the Wisconsin Glacial Episode or glaciation, from 24,000 to 11,000 ya. During that time, the vegetation of the CFO which is now dominated by Chihuahuan Desert shrublands and grasslands was dominated by coniferous woodlands and montane coniferous forests. The Sacramento Mountains supported subalpine coniferous forests with alpine tundra and grassland (Dick-Peddie 1993). The conifer forests of the region persisted until the end of the Wisconsin glaciation and the end of the Pleistocene, about 11,000 ya. Colorado pinyon pine (*Pinus edulis*), juniper (*Juniperus* spp.) and oak (*Quercus* spp.) woodlands extended across the lowlands and merged directly with higher elevation mixed-conifer forests of Douglas fir (*Pseudotsuga menziesii*) and Southwestern white pine (*Pinus strobiformis*), and extensive ponderosa pine (*Pinus ponderosa*) forests were absent. Plants that now grow in the Great Basin such as sagebrush (*Artemesia tridentata*) and Indian ricegrass (*Achnatherum hymenoides*) were common in the northern Chihuahuan Desert. Modern oak-juniper and juniper grassland plant assemblages and trees such as alligator bark juniper (*Juniperus deppeana*) and Mexican pinyon (*Pinus cembroides*) were absent. At the end of the Pleistocene Epoch and the beginning of the Holocene Epoch when the climate and vegetation of SENM changed from cold -temperate coniferous forests to warm-subtropical desert grasslands and shrublands about 11,000 ya, is the same time that humans first appeared in the region.

The Holocene Epoch

The Holocene Epoch began 11,700 ya and extended to the present. The beginning of the Holocene was about the time when humans first migrated from northeastern Asia into the New Mexico region of North America and began using plants for food and material, so understanding the Holocene vegetation is particularly *important* for this guide. The environments and vegetation of Holocene from 11,700 ya to present are well documented for the region in and around the CFO from studies of fossilized plant fragments preserved in packrat middens by Van Devender (1990). Given the relationships between the plant species and climate today, Van Devender also was able to reconstruct Holocene climate conditions, based on what plant species were present at various times across the region.

The Holocene was a time of warming and drying climate in southwestern North America, relative to the preceding Pleistocene. The early Holocene (11,700 to 9,000 ya) climate of the region shifted from cooler temperatures with annual precipitation amounts greater in the winter than summer, to warmer temperatures and greater summer precipitation than winter precipitation about 9,000 to 8,000 ya. Throughout the Holocene, geographic distributions of individual plant species and plant communities of the Chihuahuan Desert were changing over time. Different species reached their current geographic distributions at different times. Low elevations across the region were dominated by oak-juniper woodlands with savanna and grasslands in the early Holocene. As the climate became warmer and drier through the early to middle Holocene, lowland vegetation changed from oak-juniper woodlands and grasslands to Chihuahuan Desert grasslands and shrublands, which have persisted to the present. Some Chihuahuan Desert plant species that occur today in higher elevations of the region such as papershell pinyon (*Pinus remota*), shrub oak (*Quercus turbinella*), Pinchott juniper (*Juniperus pinchotii*), sotol (*Dasylirion wheeleri*), althorn (*Koberlinia spinosa*) and various prickly pear cacti (*Opuntia* spp.) have been present since 27,000 ya (late Pleistocene), but many other lowland desert species such as creosote bush (*Larrea tridentata*), honey mesquite (*Prosopis glandulosa*), catclaw acacia (*Acacia greggii*), lechugilla agave (*Agave lechugilla*), Mormon tea (*Ephedra* spp.) and ocotillo (*Fouquieria splendens*) have been present, but not common, since 10,000 to 8,000 ya (early to middle Holocene). Also during that time, Colorado pinyon retreated north from the region, alligator bark juniper and Mexican pinyon expanded from the south into the region.

The middle Holocene (9,000 to 4,000 ya) climate was considerably warmer than the early Holocene, and plant fossils indicate that a summer rainfall regime had become established across the region. Vegetation of the time indicates that the summers received much more rainfall than in modern times, with considerable dominance of honey mesquite and catclaw acacia across lowlands, and evidence of permanent water and wetlands in basins occupied by ephemeral playas today. There also is evidence that cold arctic air masses expanded into the region more frequently in the middle Holocene than during the late Holocene, apparently restricting the northern expansion of subtropical plant species such as creosote bush, ocotillo and lechugilla agave. During the middle Holocene grasslands from the Great Plains extended across the northern Chihuahuan Desert from southern Arizona, southern New Mexico, TransPecos Texas, and far south into Mexico.

The late Holocene (4,000 ya to present) climate transitioned to the same general climate regime that occurs today, with greater annual variability in rainfall, more frequent droughts, and a reduction in the frequency of cold arctic air masses in the winter. The Chihuahuan Desert reached its maximum northern geographic limits during that time, and remains so today. The current desert scrub communities became established over the past 5,000 to 4,000 ya in the late Holocene. Subtropical plant species such as creosote bush moved north and higher in elevation, and succulent desert scrub vegetation replaced many areas of desert grassland. The Chihuahuan Desert reached its maximum extent during the late Holocene, occupying the region that it does today.

European Settlement and Human Caused Environment and Vegetation Changes: The Last 150 Years

Natural Holocene plant communities of the CFO were little affected by humans until European settlement of the region about 150 ya. Dick-Peddie (1993; Chapter 2) provides good historic accounts of human caused environmental impacts during that time, including numerous references providing specific information from particular locations and dates. The impacts of Europeans on vegetation was particularly focused on plants that were of economic value to people, primarily grasses as forage to domestic livestock, and trees for building materials and fuels. During the mid to late-1800's extensive wood-cutting resulted in a dramatic reduction of tree stands in conifer and riparian forests, while extensive livestock grazing consisting largely of sheep but also extensive herds of cattle, resulted in the loss of grasses from many desert grassland areas.

Former Mesa-Plains grasslands (as defined by Dick-Peddie 1993) transitioned to desert grasslands at lower elevations, while juniper has expanded from higher elevations into the grasslands forming juniper savanna communities. Former desert grasslands, especially those dominated by black grama (*Boutelua eriopoda*), transformed into Chihuahuan Desert Scrub, dominated largely by honey mesquite and snakeweed in a process called desertification (Dregne 1986, Whitford 2002). Once semi-arid landscapes have become desertified, only via careful management and many years of restoration effort can these areas become productive again (see **Restore New Mexico** as an example of a successful restoration program).

Montane conifer forests of the region also were significantly changed over the past 150 years. Southwest conifer forests, especially ponderosa pine, are fire-adapted and the stand structures and plant species compositions were based on frequent, low severity surface fires that consumed fire adapted understory vegetation and reduced tree saplings, resulting in open stands of primarily larger class trees and well developed understory herbaceous vegetation. Wildfire suppression and livestock grazing of understory vegetation over the past century led to forests being overgrown with high densities of smaller size class trees, resulting in infrequent high-severity crown fires that tended to destroy the forests.

Dams and water diversions of rivers also have caused changes in riparian vegetation of the region. Rivers such as the Pecos and Delaware were subject to frequent overbank flooding that many native riparian plants were adapted to and in many cases, that natural disturbance process was needed to maintain the native riparian vegetation. The construction of dams on the rivers stopped the natural flooding disturbance process, and greatly reduced the reestablishment of native riparian trees such as cottonwood. Intense domestic livestock grazing along riparian areas also adversely impacted and reduced native riparian vegetation. Dams and water diversions of rivers have caused many riparian changes, so have increasing demands on freshwater aquifers. In recent years, use of freshwater aquifers for irrigation and industrial purposes have lowered the water tables in the CFO region. This in turn causes small springs and seeps to dry up and dependent riparian areas to disappear…perhaps far more so than dams and water diversions in modern times.

At the same time, exotic riparian species such as salt cedar and Russian olive were introduced to the region, and they have largely replaced the native riparian vegetation. The introduction of exotic invasive weeds over the past century, such as Russian thistle, kochia, Russian knapweed, and many others have changed the species compositions of most plant communities of the CFO. Exotic invasive weeds are easily spread by livestock and transport of livestock feed, and once established tend to outcompete native vegetation in human disturbed environments. The vegetation communities that exist now in the region are different from the native species communities that existed just over a century ago, largely due to the activities of European settlers in the region. Currently, human-caused climate change (Gutzler 2013) is affecting vegetation of the Southwest (Brusca et al. 2013), and is expected to continue causing even more pronounced changes in the near future. Recently there have been proposals to designate geologic time period from now on as the Anthropocene Epoch, because of the significant effects that the world human population is now having on the world's climate, environments and biota; not unlike major events of the past that changed the world in similar ways.

Archaeology and the History of Plant Use in Far Southeastern New Mexico

Jim A. Railey

To understand plant use in the past, a description of the cultures and human history of Southeast New Mexico must be presented. Human plant use is one part of a number of integrated systems within a culture that any particular society must manage to be successful. That success is typically measured as the ability for a culture to maintain its population, reproduce and potentially grow. Food must be acquired, tools must be made, and culturally important rituals and ceremonies must be performed; plants are all a part of these culturally mediated processes. Plants are a part of an ecosystem, as are humans, and as ecosystems change through an annual cycle, so do plants, and by extension so do human behaviors. We understand that plant use is part of a cycle, and as environments change, so do ecosystems, and that in turn causes human cultures to change as well. This change in human culture history will now be presented through the time, highlighting what we do know about the past and areas where we could know more.

Looking at far SENM today, it is hard to imagine this was ever a lush grassland, where people with stone-age technologies roamed widely across the landscape, hunting and gathering and, for a time, farming. But that is precisely the way it was for much of the past 13,000 years. Evidence of human activity pre-dating historic times can be found almost everywhere across the region—stone tools, pottery fragments, and charcoal stains from countless hearths and cooking pits littering a landscape that is now much more of a desert than it once was. This is the time-worn record of an unwritten past, mute witnesses to a history whose details remain mostly unknowable, but one we search for with archaeological investigations.

Figure 25. Excavating at the Red Tank Site, an open air occupation, in the BLM-CFO

Who were the people that left these traces behind? They were the ancestors of people collectively referred to as American Indians, or Native Americans. They were the heirs to more than a million years of years of human evolution, which culminated with the emergence of biologically modern humans some 200,000 years ago. The dramatic geographic expansion of our species brought people, and their cultural traditions, to the Western Hemisphere sometime late in the Ice Age. Here they carried on the cultural-evolutionary journey, shaped in part by material and behavioral elements and patterns brought by their earliest ancestors to the New World, and adapted to the diversity of environmental conditions they encountered.

Their journey involved a step-wise succession of technological and social developments that accelerated dramatically among human populations worldwide

Figure 26. Site survey, defining surface features, in the Loco Hills area in the BLM-CFO

after the end of the Ice Age—the period referred to as the Holocene, and which includes the present day. Each generation learned and acquired an accumulated compendium of knowledge concerning the properties and uses of a staggering array of natural resources. To wrest a living from those resources they employed strategies and technologies that included an impressive degree of advanced planning. Like us, prehistoric people in far SENM were members of communities and societies. Their lives were enmeshed in social networks and organizations that enhanced their survival, and broadened their access to natural resources beyond their immediate home ranges. Their social networks helped them find mates and establish families among "neighbors" who were often dispersed across the landscape, and frequently on the move. Moreover, the never-ending process of socialization and enculturation provided them rules and frameworks governing one's kinship status, social roles and responsibilities, marriage arrangements, and behavioral protocols for interacting with others (including those ranging from the closest family members to socially distant "foreigners"). To the extent that their visible world was carved up into ethnic enclaves, many people may have been multi-lingual. And to make sense of it all, their cultural heritage provided narratives through which they conceptualized their world and the universe, with their beliefs woven into social expression through rituals and group ceremonies.

Although we will never know the names of great leaders, read of bloody skirmishes, or hear heroic tales of survival about prehistoric people in the region, we can gain a sense of their collective history. It is the archaeologist, through painstaking recovery and analysis of fragmentary remains, and descendants of native peoples, heirs to their cultural traditions, who tell their story. As a result of archaeological research, we now have many glimpses of lifeways and histories that have long since vanished. We can visualize the

Figure 27 Archeological excavations at a pit house site near Carlsbad in the CFO region. Careful documentation in the field preserves the context of finds and samples in the excavation process.

stone tool maker, the primitive hunter, the monotonous tasks of daily life, and the ceremonies that punctuated the cycle of existence. We can witness the succession of far SENM's prehistoric peoples from Ice-Age hunters, to Holocene hunter-gatherers, village-based farmers, and tipi-dwelling bison hunters. It is a history without names, but one worth telling nonetheless.

The archaeological remains they left behind are an impoverished record not only of the array of tools and materials they produced and used, but also of a multitude of lives enmeshed in cultural traditions and historical events and circumstances whose details we will never know. The vast majority of archaeological remains found in far SENM were left behind by Holocene hunter-gatherers. These people relied on what most of us today would consider bush-survival skills. But unlike the staged exploits of those performing on outdoor-survivalist television shows, the lives of Holocene hunter-gatherers were much more than a desperate, hand-to-mouth existence. Their lifeways and organizational structures were "simple" compared to larger, more "complex" societies of people who relied on farming, or other hunter-gatherers blessed with more abundant and concentrated resources (such as the salmon-reliant societies of the Pacific Northwest). While farming and other more complexly-organized societies did establish a toehold in the region nearly a thousand years ago, this important development was a rather short-lived phenomenon here, and before the Spanish arrived, the people had either left the area or switched to a tipi-dwelling lifeway focused on bison hunting.

Radiocarbon Dating in a Nutshell

Radiocarbon dates are determined by measuring the amount of ^{14}C in an organic sample. ^{14}C is a radioactive isotope of carbon, constantly created in the atmosphere by the interaction of cosmic rays with nitrogen. In the atmosphere, ^{14}C quickly combines with oxygen to form carbon dioxide (CO_2), which is incorporated into plants by photosynthesis, and in animals who eat plants (and those who consume plant-eating animals). When an organism dies, the intake of ^{14}C stops and is progressively lost through radioactive decay. The decay rate is known (the half-life of ^{14}C is 5,730 years), and so the time of an organism's death can be calculated from the ratio of ^{14}C to ^{12}C (one of two non-radioactive isotopes of carbon). However, the ^{14}C:^{12}C ratio has not remained constant over time, either through variations in ^{14}C production in the atmosphere or ^{14}C uptake by plants or large water bodies, this was confirmed by measuring the ratio of ^{14}C:^{12}C in tree rings of known age. Thus radiocarbon determinations must be calibrated to produce a more accurate age of the sample; this age is expressed as a statistically-determined range (i.e. 2550 years BP ± 50 years). Archaeologists commonly use the range produced from a 2-sigma calibration, which means there is a 95% probability that the actual age of the specimen lies within that range. Radiocarbon ages here are given as two-sigma calibration ranges.

Living in a world without metal, the native people of far SENM depended heavily on making and using a variety of stone tools, and by inference also made many plant and animal based tools that have long since degraded in the open environment. Archaeologists focus on stone tools because these are the most common representations of human behavior that are preserved in SENM. We can infer plant use and other activities from studying stone tools, therefore we must understand this part of the archaeological record to understand many other parts. Sharp-edge tools and projectile points (spear- and arrow tips) were chipped from fine-grained stone such as chert, chalcedony, petrified wood, and opalized caliche. Coarser materials, like quartzite and basalt, were used for cutting and chopping tools that required durability. In far SENM these types of tool stone occur as pebbles and cobbles in ancient gravel deposits, mostly along the Pecos River, but also in limestone outcrops (most of which are west of Pecos) and in the Caprock caliche to the east. People shaped metates, used for grinding seeds and other materials, from large slabs of sandstone and limestone, and their companion manos were made from cobbles or fragments of broken metates. Pestles—used for processing ***mesquite pods*** and perhaps other important plant foods—were made from heavy, elongated cobbles. Because these various types of stone do not occur everywhere, it was often the case that people had to transport them (or pieces of these materials including finished or nearly-finished tools) over appreciable distances. Sometimes the distance to sources of tool stone is reflected in the artifacts found at a site. For example, pieces of debitage (the waste flakes produced from making chipped-stone tools) tends to be much larger on average at archaeological sites located at, or close to, tool-stone sources. These sites also tend to have more and larger cores (usually globular-shaped pieces from which flakes were detached in the course of tool-making) than do sites farther from these sources. Artifacts of obsidian (a volcanic glass whose superior flaking qualities made it a highly-prized material) are sometimes found in archaeological sites in far SENM. This material does not occur naturally in the region and had to be imported from distances of over 120 miles.

Our story is divided into four main periods:

Paleoindian Hunter-Gatherers (11,500-7000 B.C.)

Holocene Foragers (6500 B.C.-A.D. 1100, also called the **Archaic**)

Village Farmers and Their Contemporaries (A.D. 1100-1450, also called the **Formative**)

Native American Nomads (After A.D. 1450)

These periods generally follow the cultural-historical framework that archaeologists use to discuss long-term changes over time, with one main exception. Archaeologists use the appearance of pottery, which occurs around A.D. 500, to divide the Archaic and Formative traditions. Pottery was certainly an important addition to the lifeways of prehistoric people in the region, and provides a highly visible marker that archaeologists can use to assign a site (or at least some of its archaeological remains) to the Formative tradition or a specific period or phase within that tradition. But archaeological evidence to date indicates that the introduction of pottery did not coincide with any major changes in lifeways or the use of plants by Native Americans in far SENM.

Since the 1950s, radiocarbon dating has enabled archaeologists to determine more precisely the chronological ages of cultural traditions and periods, and as a result we know that people were in the region for at least 13,000 years. Today there are well over 1,000 radiocarbon dates from archaeological sites in far SENM, and in themselves these dates create the framework for this story. Through other advances in archaeological research, each period can now be characterized by the ways in which people carried out their lives—their technologies, what foods they ate, their settlement and mobility strategies, and even social organization, burial customs, artistic expression, patterns of trade, and ideology and religion. Obviously, some aspects of prehistoric lifeways are easier to recognize than others. For example, the archaeologist can speak much more confidently about past technologies than she or he can about prehistoric social structure or, especially, religious beliefs. Stone tools, and the waste debris from the production of these tools, are especially informative, in part because these items are so common at archaeological sites across the region. But also because archaeologists have come to understand them through countless experiments in replicating the production of stone tools, and from accounts of surviving stone tool-making people observed in other parts of the world.

When we shift from durable material culture (stone) to perishable material culture (plant and animal) we can only infer their production and use from modern ethnographic analogies and from the rare locations were perishable materials are preserved, such as in caves. Plant material culture can be broken down into many categories, and any system we use can be recombined. There are a few basic areas of plant use we can consider and weight the most likely plant species as options for that part of material culture. Using modern ethnographic materials, such as Julia Jordan's *Plains Apache Ethnobotany*, plant use is broken down into four categories: edible plants, ritual and medicine, material culture and firewood, personal care and adornment. With these four categories (and multiple subcategories) we can place most plants into levels of likely use for each category; this process will produce a system of plant use that can be compared to or potentially looked for in the archaeological record. These categories with potential plant use will be presented in the next chapter, but now we will present a brief history of the four major cultural time periods for SENM.

Paleoindian Hunter-gatherers (11,500-7000 B.C.)

The first people arrived in the Western Hemisphere toward the end of the Ice Age, when vast ice sheets covered most of present-day Canada and some northern parts of the United States. The ice sheets locked up so much of the earth's water that sea levels were much lower than today's and many areas now lying beneath the ocean were dry land. Much of Alaska, where the interior is very dry, remained ice-free, however, and before the final melting of the ice sheets Alaska was connected to Siberia by a now-submerged "land bridge." Groups of Ice-Age hunters moved freely across this land bridge, and at some point made their way down into lower parts of North America. When this first happened remains a matter of debate. A slew of discoveries in recent decades is pushing back the antiquity of humans in various parts of North and South America to well before the beginning of the Paleoindian time frame. These "Pre-Paleoindian" people most likely were present in far SENM, but if so their archaeological remains have yet to be discovered or positively identified. So for now, the earliest, well-established presence of humans in the region dates from the Paleoindian tradition. Paleoindian sites and components in the region are recognized almost exclusively by distinctive projectile points. There are radiocarbon dated camp- or kill sites in eastern New Mexico and west Texas, although thus far there are no radiocarbon dates from this tradition in far SENM. Although Paleoindian projectile points are scattered across far SENM, there are very few sites containing recognizable concentrations of artifacts and other remains from this earliest chapter of the region's human history. What artifacts and sites have been found suggest concentrations of Paleoindian people along the **Pecos River**, the base of the **Caprock Escarpment**, and in far southeastern Lea County near what were probably **lakes** that formed during wetter (pluvial) periods in the past.

The scanty nature of Paleoindian sites and artifacts in far SENM is probably an indicator of several factors: 1) low population densities compared to later times, 2) the difficultly of recognizing Paleoindian occupations in the absence of distinctive projectile points, and 3) the complete absence of radiocarbon dates from this span of time. The lack of radiocarbon dates is probably attributable in large part to Paleoindian cooking technologies, which involved the use of direct heat, as opposed to pit baking and hot-rock cooking, which came into use during the subsequent Archaic tradition (more on this below). Also, Paleoindian animal-kill sites—which might otherwise provide bones for radiocarbon dating—have not yet been discovered in far SENM.

Paleoindians have traditionally been viewed as big game-hunting specialists, primarily due to excavated kill sites and large, exquisitely made projectile points that tipped their spears. Kill sites show that people hunted a succession of large mammals or "megafauna." These include mammoths that roamed the ice-age plains until their extinction about 10,800 B.C., followed by *Bison antiquus*, a larger ancestor of the present-day bison up until 9800 B.C., and after that bison more similar to our present-day. There is also increasing evidence and a growing recognition that Paleoindian peoples hunted or otherwise captured smaller mammals as well, along with a variety of birds and reptiles.

In terms of preserved and recovered artifacts for Paleoindian sites, the empirical basis for our knowledge, archaeologists focus on stone tools and tool parts (and the debris from their manufacture from all time periods), because these durable materials survive the ravages of time much better than items made from perishable, organic substances. Flaked-stone tools were certainly critical to the survival of people without metal technology, and Paleoindian stone-tool assemblages seem to underscore the emphasis and hunting, butchering, and processing mostly large game animals, for their meat, hides, and other materials. But as many archaeologists are coming to realize, stone tools provide only a very narrow and limited window into the lifeways of prehistoric people, and from observations of stone-age people who survived into historic times, we know that bone, hide, sinew, wood, fiber, cordage, basketry, and featherwork were equally or more important to their lives than stone. Even hunting weaponry probably involved the use of plant-derived materials. This is where a system of theoretical plant use is important to fill in the gaps of our empirical knowledge. However, until proven valid with recovered evidence, any plant use system will always be limited to theory or speculation.

Evidence suggests that Paleoindians did not have the bow-and-arrow, but rather used a projectile-weapon set composed of a spear (or dart) and *atlatl*, or spear-thrower. The spear or dart would have been a composite tool with a main shaft made from a lightweight *wood*, and the foreshaft from a *hardwood* or perhaps from bone rods similar to ones found at Paleoindian sites in the northern American West. The dart was tipped with a flaked-stone or bone point, or simply the fire-hardened and sharpened tip of the spear or dart foreshaft. The atlatl itself was probably made from *hardwood*.

In recent years, more and more archaeologists are challenging the image of Paleoindians as specialized, big-game hunters. There is evidence to suggest that Paleoindians practiced big-game hunting not so much

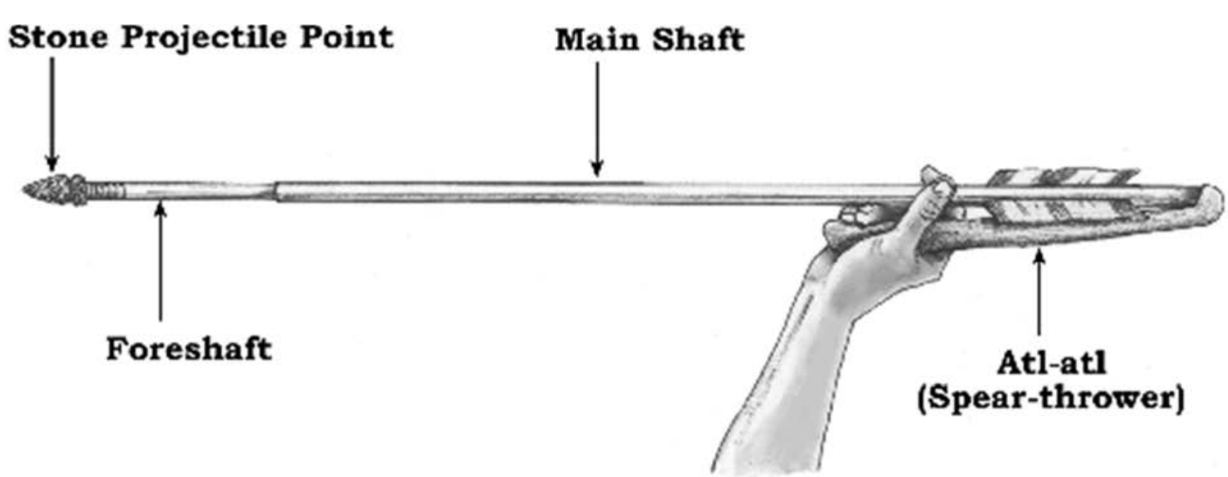


Figure 28. The spear thrower, or atlatl, and dart was the main projectile weapon set before the arrival and adoption of the bow and arrow (drawing by Jim A. Railey, courtesy of the NMDOT)

Figure 29. Rabbits were perhaps the most important and regularly hunted game animal after the Ice Age, nets made of woven fibers and rabbit sticks made of wood would have been essential in harvesting this game type. (drawings by Jim A. Railey, courtesy of the NMDOT).

for the purpose of obtaining a critical food source, but rather as a way for males to attain social status. Even their exquisitely made, and very fragile projectile points—which were often made from exotic materials obtained from sources hundreds of miles away—may have had as much or more symbolic and ritual value as they did any practical function. Observations of surviving hunter-gatherers in sub-Saharan Africa suggest that big-game hunting was not critical to their survival, and was very inefficient in terms energy expended versus calories obtained. Moreover, big-game hunting among these people occurred at the same time of year that protein-rich nuts and other plant foods became available, and it was the availability of these more important plant foods, in fact, that made the luxury of big-game hunting possible.

Unfortunately, we know next to nothing about Paleoindian uses of plants. This is due mainly to the extreme rarity of archaeologically collected sediment samples containing charred plant remains from Paleoindian archaeological sites in North America—and the complete absence of such samples from far SENM. Indirect evidence for the processing and cooking of plant foods is also lacking. Unlike the subsequent periods there are no ground-stone tools used for processing plant foods, such as manos, metates, and pestles. Burned rock, used as cooking stones for pit baking of various food items and which is common in younger archaeological contexts, is mostly absent in Paleoindian sites, as are preserved remains of cooking pits themselves. Again this lack of knowledge can only be filled in at the present with ethnographic/archaeological analogy in the form of a theory/system of plant use.

Native plant communities in far SENM were also very different during Paleoindian times than during the subsequent Holocene epoch. Moreover, dramatic climate change, including episodic droughts and an overall warming trend over the course of the Paleoindian period, altered the biotic environment. In general, compared to the present, plant communities were displaced to much lower elevations during the colder conditions that prevailed during early Paleoindian times. More modern ecosystem regimes gradually moved toward their present positions toward the end of this time frame. Grasslands still prevailed across the Mescalero Plain and Llano Estacado, but during the late Pleistocene they featured plants adapted to cooler and wetter conditions than prevail in the region today. By the end of Paleoindian times they had evolved to the warm-season and more arid-adapted, shortgrass prairie and Chihuahuan desert environments more characteristic of historic times. But again, due to lack of evidence we know essentially nothing about how Paleoindians used plants in these evolving biotic communities for food, tools, containers, and other items. A comprehensive paleoenvironmental reconstruction, focusing on plant and land form changes in SENM would be necessary to map plant communities in this early period.

Holocene Foragers (6500 B.C. to A.D. 1100): Archaic to Early Formative

After Paleoindian times there were major changes in the lifeways of people across the Americas, including those living in far SENM. Like their Paleoindian predecessors, Holocene hunter-gatherers of the Archaic in the region did little or no farming, and were dependent on *wild plants* and animals for their sustenance. Most species of large-game mammals from the Ice Age were now extinct, and archaeological evidence suggests that hunter-gatherers turned to a wider range of food resources, both plant and animal. Deer, pronghorn, bighorn sheep, and bison (when they were present) were the main big game animals after the Ice Age. Over most of this period the atlatl appears to have remained in use, although stone points used to tip the accompanying darts are generally smaller and less well made than those of Paleoindian times. Projectile points of the Archaic period vary considerably in shape, with both notched and stemmed forms. *Resin* from conifer trees was sometimes used as a mastic to affix points to the ends of dart foreshafts, and this was especially common for points with straight or expanded stems. Three atlatls collected from caves in the Guadalupe Mountains are flattened hardwood shafts made from saplings or split branches, one was positively identified as an **oak** species. The one complete specimen has a channel groove and hook (to receive the near, or nock, end of the dart), and notches where leather finger-loops were attached, typical of Southwestern atlatls. Faint bands of discoloration mark the former location of the finger-loops, and also occur along the atlatl midsection where a stone weight would have been attached. The hook itself was elevated slightly by warping the far end of the atlatl; experiments suggest this was accomplished by steaming the shaft and then bending it inside the fork of a **tree**. Many atlatls were painted with a red iron oxide-based pigment, and on at least two atlatls from the Guadalupe Mountains is a resinous coating with macerated **yucca** fibers, which may have served as a varnish to seal the red paint (although some archaeologists contend that this "varnish" is, in fact, of natural origin, perhaps from the atlatl being covered in bat guano or packrat urea). Two of the atlatls from the Guadalupe caves were radiocarbon dated; the complete specimen yielded a date of 790-410 B.C., while the second one was older, with a date of 1140-920 B.C.

Eventually the atlatl was largely replaced by the bow and arrow. The timing of the bow and arrow's arrival in various parts of North America is hotly debated. But most archaeologists agree that the widespread appearance of distinctly small, thin, flaked-stone projectile points, or "arrowheads," signals this important shift in projectile-weapons technology. In SENM, the appearance of small arrowheads occurred in the 6th century A.D., with the best evidence coming from a series of well-dated sites in the Rio Hondo watershed, in the highlands west of Roswell. People selected lengths of **wood** from species whose springiness and other material properties made them suitable for use as bows. In SENM these species include **mountain mahogany**, **juniper**, and **Gambel's oak**, all available in the highlands west of the Pecos River. Arrows were made from various types of **wood** as well as **cane** from ***Phragmites* grass**. Many darts and arrows were not tipped with stone points, but rather had **hardwood** foreshafts that were simply sharpened at their distal ends.

Perhaps the most important and regularly dispatched prey of Holocene hunters were rabbits. Hunter-gatherers in the Great Basin, observed in historic times, had "rabbit drives," where large groups of people deployed long, narrow, game nets that resembled tennis nets, and herded rabbits into them. Native people in far SENM probably used similar hunting

Figure 30. A Jicarilla Apache bow made of wood, sinew and paint, in the collection of the National Museum of the American Indian, specimen 1/3975

Figure 31. Apache women loading mescal agave hearts into an earth oven. Photograph by Edward S. Curtis, circa 1900s. National Anthropological Archives, Smithsonian Institution.

practices. Game nets do not preserve outside of dry caves and rockshelters, and none have been found in far SENM. But there are historic rabbit drive nets in the Great Basin that are hundreds of feet long and made from twisted **grass fibers** and cordage from native **hemp**. In the Rustler Hills of west Texas, just south of SENM, a game net found in Shelby Brooks Cave was rolled up on "spools" consisting of six pointed **agave** or **yucca** stalks. **Wooden** "rabbit sticks," thrown similar to a boomerang or employed as a club on rabbits caught in nets, were common among native peoples in the Southwest and Great Basin. Crooked poles of **wood**, with a hook-like curve at one end, were also used to obtain rabbits by either poking them out of their burrows with the straight end, or by twisting the curved end into their fur and pulling them from their burrows.

Archaeological evidence shows that a variety of plant foods were collected, processed, stored, and eaten by Holocene hunter-gatherers. These included the **seeds** of wild **grasses** and **weeds**, such as **dropseed grass**, **wild barley**, and **sunflower**, as well as **yucca root**, **agave hearts**, **cholla** and **prickly pear buds**. Starchy and oily **seeds** collected from native **grasses** and **weeds** were ground into flour by Holocene hunter-gatherers using manos and metates. To increase the productivity of wild food resources, hunter-gatherers in far SENM probably burned off patches of land from time to time. This promoted the growth and density of grasses and weedy species bearing edible seeds. Grass seeds were collected in baskets (in turn made of grasses) by beating the seed heads with a **stick** or a textile "seed beater." The collected seeds were then usually parched, by placing them in a shallow basket along with hot coals, and tossing and rolling them around together in the container to roast the seeds but not burn them. Sometimes the interiors of parching baskets were lined with a thin layer of fine mud or clay to protect the textile surface from burning. Parching helped remove the lighter chaff, and enhanced their storability, cooking and digestibility.

As far as providing food (as well as firewood and materials for tools and hut structures), **mesquite** was probably unsurpassed among the region's plant

Figure 32 Tree cholla "buds" (*Cylindropuntia imbricata*) are actually modified stems and are preferred before they mature due to a large number of inedible seeds after ripening. The buds are available in the spring, primarily in ecoregions 1, 4, and 7.

resources. Stone pestles were mostly likely used to process mesquite pods, and the pestles were probably used most commonly with **wooden** mortars made from **mesquite** stumps. Wooden mortars do not survive into the archaeological record, or at least not at open-air sites exposed to the elements. But we do know they were used by native people in the Desert Southwest during historic times, and so it is likely they were also used in the more distant past. Unlike the grinding action employed with manos and metates, pestles and mortars involved a pounding technique to process plant foods. This was especially effective for substances like mesquite pods, which create a sticky mass when crushed, and are thus are not well-suited to grinding with manos and metates. **Acorns** from **shinnery oak** (which are low in tannic acid compared to many other acorns), cattail roots, or other foods may also have been processed with mortars and pestles, although direct evidence for the use of these plants is rare at best.

Pit-baking is a time-honored cooking method that in North America became commonplace after Paleoindian times. Heated stones and food were placed in these cooking pits, which are also known as "earth ovens," then buried with the dug-out backdirt. Foods were then slow-cooked in the pit for several hours or even days. Sometimes hot coals and ash were added into the cooking pit as well, or were used instead of cooking stones. In fact, there was a wide variety of cooking-pit configurations and techniques, some involving ingenious ways of introducing water into the pit to steam the food using canes as water straws. Roasting pits were used to cook both meat and plant foods. Experiments and observations of traditional pit cooking show that meat was cooked in tightly wrapped packages, the wrapping consisting of multiple layers of **leaves**, **grass**, **textiles**, or other materials that may have been secured with **cordage** or other **fibers**. Unlike cooking directly over an open flame, baking meat in leak-proof wrapping helps retain the grease, oils, and other nutrition-rich substances contained within its tissues. This was critically important for Holocene hunter-gatherers especially, who needed all the nutrition—especially the fat—they could squeeze out of the wild game they procured. Moreover, pit cooking allows for the inclusion of **herbs**, **berries**, and other plant foods to help flavor the meat and vice-versa.

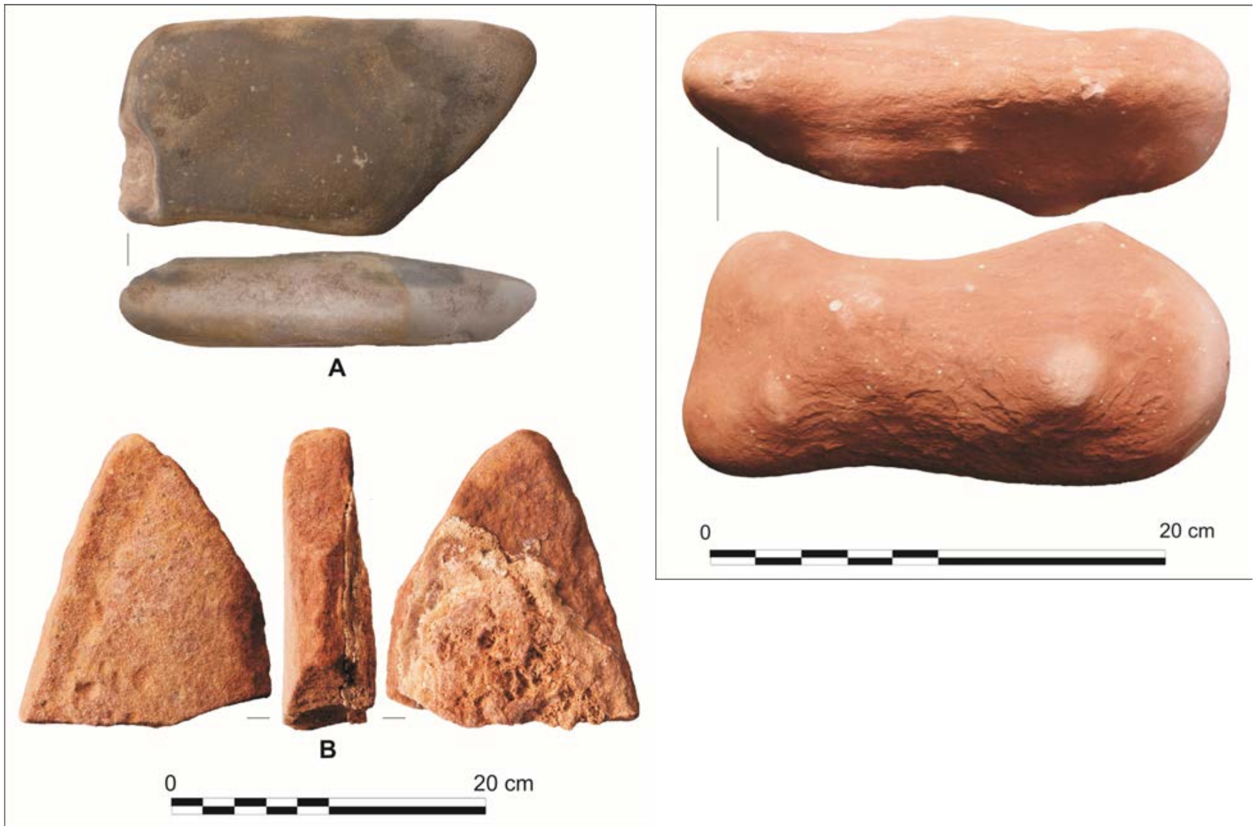
For many plant foods, such as **roots**, **tubers**, **cholla buds**, **cactus pads**, and the hearts of succulents like **agave**, pit baking provided the long cooking time needed to made their tissues more digestible and thus delivered more nutrition upon consumption. In some cases (such as agave hearts), pit cooking neutralized toxins that made the plants inedible and converted the starches into sugars. Pit-roasted agave hearts were especially important to the native peoples of the southern American Southwest, as they were a highly prized sweet in an environment with few naturally occurring sources of sugar. The cooked agave hearts could also be stored and turned into alcohol (mescal and tequila are made from agave hearts). In historic

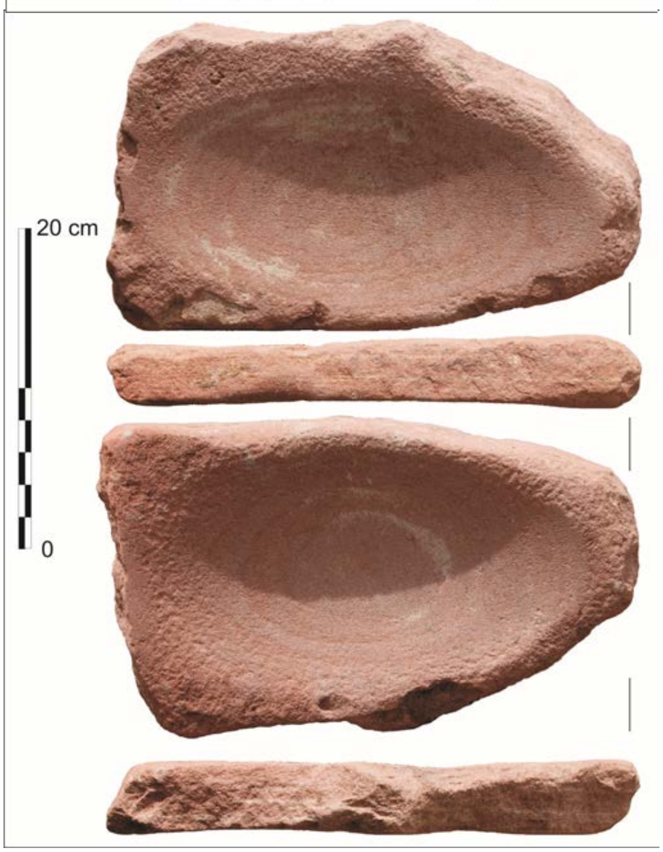
Figure 33. A simple hut used by Holocene hunter-gatherers. Most of the plant materials in these structures decay before being preserved in the archaeological record. (drawing by Jim A. Railey, courtesy of the NMDOT)

times—and down to the present day—harvesting and pit-roasting agave hearts is an important part of Mescalero Apache girls' coming-of-age ceremonies. In far SENM, agave is more common along the Pecos River and to the west and much rarer in the Mescalero Plain to the east.

Early in the Archaic we find the first evidence for a very special class of archaeological sites known as burned-rock middens. Burned-rock middens were formed through repeated pit-cooking events, some of which may have involved exceptionally large pits and volumes of cooking stones. These were often used for cooking **agave hearts**, and indeed remains of **agave** are sometimes found in these features in far SENM, along with "agave knives"—large, tabular-shaped stone tools that were used to remove the tough agave leaves from their hearts. Other foods were cooked in the pits beneath burned-rock middens as well; excavations of several burned-rock middens in the northern portion of Fort Bliss (outside of the CFO) suggest that cholla buds were commonly cooked at those sites. In some spots the process of pit baking with hot rocks, and cleaning out the pit to retrieve the cooked foods, was carried out repeatedly—sometimes over many years or even centuries—to the point that large mounds of burned rock accumulated on their perimeter. The cooking and clean-out process often resulted in ring-like rock mounds with central depressions, and hence archaeologists often refer to these kinds of features as "ring middens." The possibility of repeated use of a location for pit cooking of course depended on there being a sufficient and sustainable supply of firewood in the vicinity. Accordingly, burned-rock middens are found mostly west of the Pecos River, in the Guadalupe Mountains and its foothills. Here there was a much greater supply of firewood (including **junipers** and, higher up, **piñon** and other trees) and **agave** than out in the Mescalero Plains, where this type of site is much rarer.

Before about A.D. 500 most native peoples in SENM lacked pottery. To cook liquid foods they probably employed a method using hot rocks known as stone boiling. Stone boiling uses water-tight baskets, baskets lined with clay or hides, or wooden containers in conjunction with stones heated in nearby hearths. The hot stones are placed in the liquid-filled container, and the food/hot rock mixture is stirred to facilitate even heating and prevent the bottom of the basket from





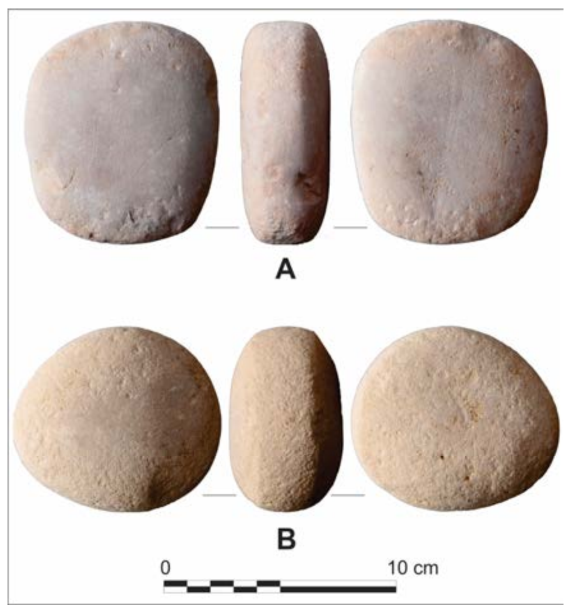


Figure 34. Grinding and plant processing artifacts, (upper left) slab metate, (upper right) pestle for crushing, (lower left), basin metate for grinding, (lower right) manos used in conjunction with metates for grinding. These artifacts were recovered from archaeological excavations at the Red Tank site, near Loco Hills in the CFO region.

Radiocarbon Dating and the Old Wood Problem

Native Americans in the Southwest often collected dead wood to burn in their hearths and campfires. Because wood does not decay as quickly in a dry environment as in a wetter one, sometimes dead wood can lie around for several hundred years after it was collected and burned. Moreover, the wood itself is of variable age; during its growth cycle the inner parts of a tree will die as the newer, living tissues accumulated around it. This has obvious implications for radiocarbon dating, since burning of old wood will produce a calculated age for the wood that is older than the actual burning event—sometimes by several centuries or more. The problem is not restricted to large trees (which are not present in the desert lowlands of far SENM), but extends to smaller trees and even wood from shrubs such as sagebrush, four-wing saltbush, and greasewood. For these reasons, archaeologist prefer to date "annuals"—plant parts that lived and died in a single year, such as seeds and corn kernels or cupules (the pocket on a corn cob that holds a pair of kernels). But oftentimes wood charcoal is the only material available for radiocarbon dating. Thus the "old wood" problem is something that archaeologists must keep in mind when examining and interpreting radiocarbon dates.

Burning old wood, like this dead mesquite tree exposed in the side of a dune, can yield radiocarbon dates that are much older than the actual burning event.

getting too hot. As the heat from the stones is dissipated, the cold stones are removed and freshly heated stones are introduced. This process of removing cold stone and replacing with hot stones is repeated until the stew, broth, or gruel is brought to a boil, and sustained until thoroughly cooked. Stone boiling was observed in historical times among some of California's native people, and stone boiling by pre-ceramic Holocene hunter-gatherers in far SENM probably contributed to the many tons of burned rock found on archaeological sites in the region. The advent of ceramics in the area around A.D. 500 may have made stone boiling obsolete to some extent, as liquids in pottery vessels can be carefully heated directly over a fire or bed of coals. However, evidence suggests that ceramic vessels were not abundant in far SENM prior to the 2nd millennium A.D.; there are more than a few sites with radiocarbon dates after A.D. 500 that have little or no pottery. Thus, along with direct cooking and pit baking, stone boiling may have persisted as a common culinary practice after the arrival of ceramics in the region.

Early ceramics were not as durable as modern ceramics and cracked or otherwise damaged ceramic pots were drilled on either side of a defect, bound with a piece of cordage and then sealed using resin-coated grass patches.

The lives of Holocene hunter-gatherers involved frequent movement across the landscape, and they typically only stayed in one place for a short time, perhaps seasonally or until targeted local resources were expended. These places were often provisioned with metates and other heavy items, indicating that people returned to these places repeatedly, or at least intended to do so. They probably built only expedient, brush huts, similar to the *wickiups* of hunter-gatherers observed in the American West during historic times. In far SENM, hut frames were probably made from thin, flexible branches of **green wood** from **willows** or poles from **juniper** or **ponderosa pine**, with brush obtained from **mesquite** and other shrubs in the lower-lying open deserts, and in the higher country from **piñon** and **juniper**. Over lapping layers of **grass thatching** completed the exterior and made these huts at least somewhat water-resistant. As added protection against wind and water; **tree bark**, mats made of **rushes**, hides, or even clay were sometimes used as outer coverings for these structures. These huts would typically leave no archaeological signature, and to this day only a few remains of hut structures have been uncovered by archaeologists in far SENM.

In the western portion of our study area, in the higher elevations toward the crest of the Guadalupe mountains, were stands of piñon pine. Piñon nuts were an important, protein-rich, and highly prized food for native peoples wherever this tree occurred, and many groups traveled appreciable distances to reach piñon stands beginning in late summer and early fall. Green cones were collected and pit roasted to open their bracts and access the seeds. The cones naturally open after the first frost, and these did not require pit roasting, but were more vulnerable to the depredations of squirrels and other animals who also

Figure 35. A ring midden in the hill country west of the Pecos River. Photograph courtesy of the BLM-CFO.

feasted on piñon nuts. Piñon seeds were typically parched in basket trays and then shelled using a flat metate or other hulling equipment, with the shells removed by winnowing. Seeds were often then parched once more, and usually ground and consumed in a mush or gruel. Piñon seeds were stored for future consumption, in the form of green cones (usually after pit roasting), raw in their shells, and in the shells after the first round of parching. Native people in the Great Basin stored piñon cones in large pits covered with poles of rocks, limbs, and/or pine needles, and seeds in grass- or bark-line pits, or in skin bags placed in pits.

Observations of historically recent hunter-gatherers suggest their social organization was fluid, and that an individual nuclear family did not always camp together with the same group of other families. Through mobility, and interacting and cohabiting at multiple campsites with a variety of families and individuals, the hunter-gatherers of far SENM were able to wrest a living by obtaining food at various places and times. Their mobility strategies allowed them to obtain information about the current status of various resources—including plant foods—and the activities of other people across the landscape, and do it all in an energetically efficient manner by moving themselves to available sources of foods rather than vice-versa. From each campsite people fanned out to collect food from the surrounding landscape. Hunter-gatherers typically venture no more than 10 km (6 miles) from the camp in a given day, and usually less than that, especially if biomass and food resources were sufficiently abundant in the area surrounding a camp.

As part of their advance-planning strategies, Holocene hunter-gatherers stored food (such as seeds and mesquite pods) in small pits. These include distinctive, bell-shaped pits with small openings and expanded bases that have been used by people worldwide and are designed to store food in a dry and protected environment, guarded from the ravages of scavengers and microorganisms. Unlike people in the **Hondo Valley** to the north (in the mountains directly west of Roswell), who began farming in the 1st millennium B.C. and stored their food in very large bell-shaped pits located in or near their settlements, the mobile hunter-gatherers of the **Mescalero Plain** used smaller versions of these pits, which were dispersed throughout a groups' territory. The risk of losing any one food cache is comparatively high for mobile hunter-gatherers, because they could not always know if they were going to return to a particular place in their annual round, and were also poorly prepared to defend their caches from would-be thieves and enemies. So, by dispersing their stores of food among many small pits in different places, rather than a few, large pits in a centralized location, they reduced the risk level posed by the loss of any one cache.

We know very little about detailed patterns and long-term trends in the use of plant foods among Holocene hunter-gatherers in far SENM. This is because sediment samples collected from archaeological sites, from which carbonized plant remains are extracted in the laboratory using a water-flotation device, typically provide little or nothing in the way of verifiable plant-food remains. The predicament of many sites with very little direct botanical evidence is related mainly to the highly mobile lifeways of hunter-gatherers, who tended to occupy any one site on a short-term basis involving only small groups of people. The common occurrence of manos and metates (and, to a lesser degree, pestles) reveal that hunter-gatherers routinely ground **seeds** and processed other plant foods at their camp. But with each occupation the locations of hut structures,

Figure 36. Agave (*Agave parryi*) with flowering stalk.

Figure 37. The bow and arrow probably arrived in SENM around the beginning of the Early Formative period. The earliest bows were simple self-bows, like the one depicted here. Many plant materials are needed to successfully hunt (drawing by Jim A. Railey, courtesy of the NMDOT).

food-processing areas, and cooking and storage pits tended to shift around. As a result, hunter-gatherer camps typically did not have specific areas that were dedicated to food processing and cooking and maintained over long periods of time, like in permanent houses or villages. Thus archaeologists are confronted with very low odds of finding concentrations of charred plant-food remains which reflect accidental burning of food—something that was to be avoided.

Charred remains of plants that could represent food items are sometimes found in hunter-gatherer sites. These include **leaf bases** of **yucca**, **agave tissue** (found mostly in burned-rock middens), concentrations of charred **grass seed** (which could also be the remains of fuel, food, thatching, or bedding), **mesquite pod** fragments, and other potential plant foods. But such finds are too sporadic, and often occur as only one or a few specimens at a site and in sediment samples, to provide details about what species were used in what percentages, and how patterns in plant-food use may have changed over time, beyond presence/absence. Moreover, the intensity of sediment sampling varies considerably across the region; most samples come from the Mescalero Plain, with fewer samples from sites along the Pecos River and fewer still from the highlands to the west, and none from the Llano Estacado.

Metates can provide indirect evidence of the kinds of seeds processed on their grinding surfaces. Flat-surface metates were most frequently used for grinding **pre-soaked** or **oily seeds**. Grinding oily seeds such as **sunflower** tends to round off the individual stone grains on the metate surface, producing a smooth sheen. These slickened metate grinding surfaces, which do not function efficiently, were often rejuvenated by pecking with a heavy stone hammer; the edges of manos were sometimes used for this purpose. In contrast, processing **dried** or **parched grass seeds** does not slicken metate surfaces as regularly, and typically involved more basin-shaped metates, since the seeds would tend to fall or fly off flatter metate surfaces during grinding.

Whether or not people in far SENM practiced farming prior to A.D. 1100 remains unknown. For this time frame there are no charred remains of corn or other possible domesticates from sediments in the Mescalero Plain or along the Pecos River, and only one sample from the eastern slope of the Guadalupe Mountains contained corn. The latter case is associated with a radiocarbon date of A.D. 785-1020. To the north, in the **Rio Hondo** drainage west of Roswell, archaeological excavations show that people were heavily dependent on corn-based farming and storage beginning no later than the last centuries of the 1st millennium B.C. But the Rio Hondo drains the largest watershed on the eastern slope of the Sacramento and Guadalupe Mountains, and extends up to the crest of Sierra Blanca Peak, which contributed substantial runoff from snowmelt in the spring—a critical factor for early farmers in a land where there is little precipitation during the spring planting and early growing season. None of the other drainages in the Sacramento-Guadalupe range share such favorable conditions, so it is unclear whether or not this pattern of early farming dependence extends south of the Rio Hondo valley.

To fully appreciate the diverse inventory of plant-based tools and other hand-made items used by Holocene people in the region, one must look to dry **caves** and **rockshelters** where normally perishable items are preserved. In far SENM, there are numerous dry caves and rockshelters on the eastern slopes of the Guadalupe Mountains. Edgar Howard of the University of Pennsylvania carried out the earliest recorded cave excavation, at a site called Burnet Cave in the early 1930s. Later in that same decade, two more archaeological campaigns were carried out at cave and rockshelter sites in the Guadalupe Mountains. H.P. Mera, of the Laboratory of Anthropology in Santa Fe, excavated several cave sites, and this was followed by an excavation at Hermit's Cave by the University of Nebraska, the School of American Research, and the Museum of New Mexico. Also in the 1930s, archaeologists began excavating dry caves and rockshelters in the Rustler Hills of west Texas, just south of our study area here. After a hiatus of approximately 40 years, excavations in the Rustler Hills resumed in the 1970s, culminating with work at Granado Cave in 1978 by Donny Hamilton, then a graduate student at the University of Texas at Austin. Hamilton's was the first excavation of a cave site in the region that used modern archaeological methods, and his detailed report provides the best documentation of plant-derived artifacts and other perishable materials that include coprolites (human feces) containing a variety of pollen grains.

Among the plant-derived perishable materials found in caves and rockshelters in the region are **sandals**, **atlatls**, **bow fragments**, **arrows** and other projectile-weapon **foreshafts**, whole and **fragmented paddles**, **gaming die**, **rabbit sticks**, **digging sticks**, **fire-making equipment**, **baskets**, **mats**, **bags**, **netting**, **gourd containers**, **mescal quids** (wads of chewed fibers that had been spit out), and **cordage**. **Yucca** was most commonly used for **textiles**, **sandals**, **cordage**, and

Figure 38. Above is an example of a closed burden basket, ca. 1890, the weaver is an unknown memver of the Chiricahua Apache (New Mexico). The design features diagonal- and plain-twined, partially peeled sumac shoots with attached tin cones. Tin cones likes these have been found archaeoloigcally in SEMN. The collection of the Nation Museum of the American Indian, specimen number 22/7646.

Mesquite in the Past?

Mesquite is highly abundant now in the region but was not so much in the past. Dense grasslands shaded out mesquite seeds and prevented them from surviving; natural grassland fire regimes also helped to keep the grasslands free of shrub invasion. Overgrazing of the grasslands opened up bare soil to the mesquite and other shrub invasions seen today. When the settlers first arrived in the region they reported a vast grassland "belly high on a horse" and bemoaned the lack of trees and fire wood. On March 18, 1854, Capt. John Pope founded Pope's crossing at the natural crossing of the Pecos just south of the state line. "The crossing had a rocky bed and was surrounded by light sand and gravel when Pope found it. He reported the area vegetation as mesquite bushes and abundant grama grasses."

This report combined with other settler's reports indicates that mesquite may have been confined to draws and river drainages rather than the vast expanses of mesquite, creosote, and thornscrub that we see prevalent in some parts of the region today. Due to the rich grasslands, the Pecos River corridor was overstocked with cattle and was the overland travel route for massive cattle drives. When the grasses of the region finally ran out, cattle died in the millions in the region and massive amounts of topsoil were lost to wind and water erosion. Without the shading of the natural grasses and natural grassland fire regimes to keep them in check, the shrubs that were once confined to the drainages and river bottoms took over the landscape

mats, along with other succulents such as **sotol** and **beargrass**. **Cotton** cordage has occasionally been found in the region's caves; its presence suggests trade with other regions as there is no evidence that cotton was ever grown by native peoples in the area. At Granado Cave two **cord-mesh carrying baskets**, or **kiâhâs**, were found in association with a human burial. Rather than shoulder straps, a textile strap, or "tump line," was attached to the basket and slung over the front of one's head for carrying. **Forked** or **t-shaped wooden sticks** were typically used to support burden baskets when they were placed on the ground, or (in the case of t-shaped sticks) as a seat to stop and rest while carrying the basket.

Plant-derived materials were also used for ceremonial and ritual purposes. Musical instruments include **wooden rhythm sticks**, which had a succession of closely-spaced notches, and these were "played" using a **sounding stick** rubbed over the notched surface of the rhythm stick. Deceased humans were often placed in **textile bags**, or wrapped in **woven mats**, for burial. **Coiled baskets** were often placed over burials as well. Given the variety of these materials, it is apparent that

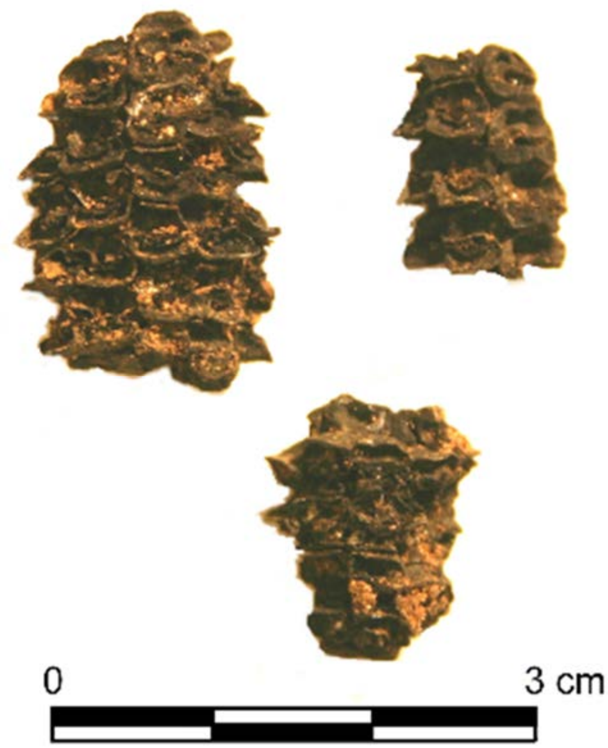


Figure 39. Archaeological corn cobs from the Merchant Site.

the potentially rich array of perishable items in most sites are not preserved.

Village Farmers and Their Contemporaries (A.D. 1100-1450): Late Formative

The early centuries of the 2nd millennium witnessed some of the most profound changes in the prehistory of far SENM. In terms of artifacts, the most prominent temporal indices of this period are a variety of distinct and well-dated decorated ceramic types, along with radiocarbon dates. Sometime around A.D. 1250, arrow points changed from strongly-shouldered, corner -notched styles to side-notched forms with weak shoulders and wider, more squared bases. This change roughly corresponds to the arrival of the sinew-backed, recurved bow in the American Southwest around A.D. 1300. The recurved bow is much more powerful than the simpler self-bow, and made for a much more deadly projectile weapon used for both hunting and warfare.

One of the other great changes that happened at this time in far SENM was the establishment of "villages," where people constructed substantial houses and stayed put for most of the year. These sites tend to have abundant artifacts, including lots of animal bone. Plant-food remains also tend to be more common at these sites compared to those of more mobile hunter-gatherers. Village sites are found in the region from the Guadalupe Mountains to the eastern parts of the Mescalero Plain. Many occur along the base of the Caprock Escarpment, where there were probably many springs and where precipitation runoff collected. The term "village" is qualified here, because some of these settlements appear to have been more scattered arrangements of individual houses instead of the more compact clusters that typically come to mind. Late Formative houses include two types: pit houses and room blocks. Some Late Formative pit houses were very substantial and sturdy constructions, dug deeply—sometimes through rock-hard caliche—and having carefully plastered walls and floors. Examples of these were excavated years ago by members of the Lea County Archaeological Society, at the **Merchant** and **Monument Springs** sites in Central Lea County. The remains of room blocks are found at the Merchant site, and perhaps also at the Peñasco Bend, a site in the upper Rio Peñasco that was excavated in the early 20th century. Some of the larger pit houses may have been ritual facilities similar to the kivas found among Pueblo Indians of the northern Southwest. Unfortunately, all of the large and substantial, Late Formative structures that we know of were dug years ago using techniques that are far below modern standards, and thus many key details about them are lacking.

From these sites we can infer that farming became an important part of native life in the region during this period. Charred **cobs**, **kernels**, and **cupules** of corn have been found at a few of the "village" sites in the region, including hundreds of charred cupules from sediment samples that BLM archaeologists recently collected from the Merchant site. People still hunted, because there were no domesticated animals except for perhaps turkeys (which people had in other parts of the American Southwest, although no evidence of domesticated turkeys has been found in far SENM). They also continued to collect wild foods, including **mesquite** pods, and the use of hot-rock cooking, agave roasting pits. The formation of burned-rock middens persisted unchecked as well.

Unlike their predecessors who moved themselves and their belongings to a series of camps over the course of the year, villagers hunted and gathered by establishing logistical camps, from which they transported food back to their villages. But this pattern may not characterize the lives of all Late Formative people in far SENM. Along the southernmost part of the Mescalero Plain, near the Texas state line, people probably continued to pursue a highly mobile, hunter-gatherer lifeway, similar to a pattern that persisted into historic times among native peoples in the Trans-Pecos region of west Texas. Almost all of the same plant-derived material, found in dry caves and rockshelters and described above, continued in use during this late period.

Sometime after A.D. 1200, a thriving trade system developed between people on the southern High Plains and their Pueblo-based contemporaries to the west. Whether or not, and if so to what extent, late prehistoric people in far SENM participated in this Pueblo-Plains interaction sphere remains unclear. But research suggests this exchange system extended from southeastern Colorado all the way down into present-day Chihuahua, and so it seems likely that Late Formative people in far SENM tried to get in on the action. There is an abundance of bison bone at the Merchant site, suggesting that the inhabitants of this village may well have been participants in this regional trading system. Among their most likely Pueblo trading partners were the El Paso phase villagers to the west, and perhaps also the Casas Grandes area in northwestern Chihuahua, where a major civic-ceremonial center was established around A.D. 1300.

The development of the Pueblo-Plains interaction sphere, and the appearance of polychrome ceramics from far-flung areas

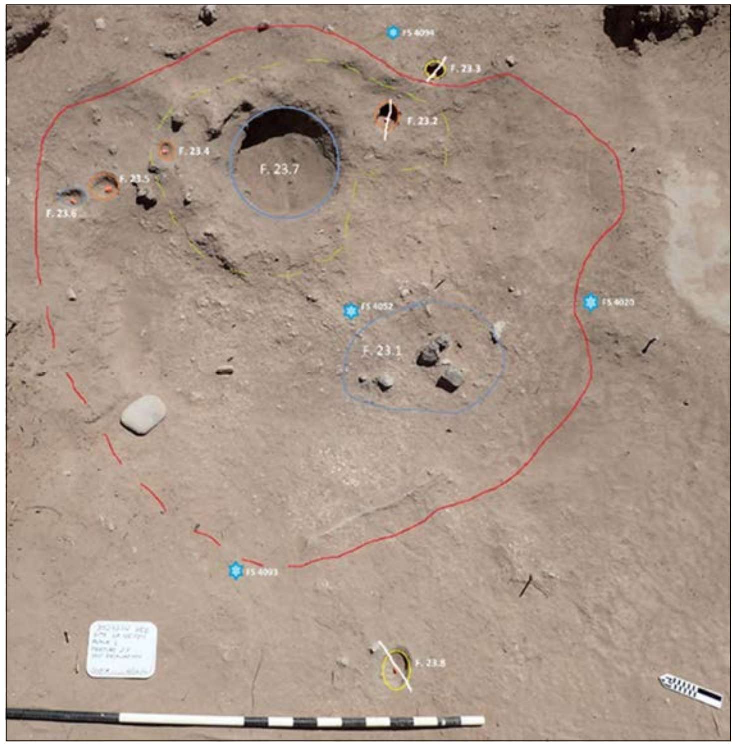


Figure 40. Shallow pit house from a site near the Pecos River, CFO region. Plan-view showing location of intramural/ extramural feature and location of artifacts.

Figure 41. Above is an example of a Mescalero Apache women's camp near the Mescalero Agency, New Mexico. This photograph was taken between 1890 and 1910. (Photograph is from in the collection of the Western History/Genealogy Department, Denver Public Library, image number F26219 DPLW.)

Knowledge about the Past

Prior to European Contact, North American indigenous cultural groups had prodigious cultural and plant use knowledge that spanned thousands of years in cultural lineage and memory. It often took a lifetime of learning and hands-on experience to master the extensive oral histories, cultural traditions, and cultural plant knowledge to the extent that one had enough "wisdom" to begin to teach it to others. Consequently, the "wisdom keepers" for many cultural groups were the older members of the group and were highly respected and cherished for the cultural wisdom that they held. Traditional culture and plant knowledge was passed down to each new generation through oral traditions, ceremonies, and "apprenticeships" to older, highly skilled members of the group.

After First Contact, many events occurred that disrupted or destroyed traditional indigenous ways of life. Loss of oral histories and plant knowledge compendiums occurred as a cumulative result of centuries of war; massacres; European slavery practices; forced adoption of European religions; forced dislocation from traditional lands; incarceration; and waves of European diseases that tended to take out the very aged, who were the holders of extensive oral histories and plant knowledge. Indigenous groups that attempted to continue to practice traditional ways were beaten, imprisoned, tortured, killed outright, and even burned at the stake. As a result, all indigenous cultural groups experienced a meteoric loss of oral histories, plant knowledge, and traditional ways after First Contact. While some cultures managed to hold onto some of their traditions, other cultures lost everything: lands, ceremonies, cultural knowledge, language, and plant knowledge. For many cultural groups, not even a single person survived.

The first official Spanish intrusion into the southwest occurred in 1541. From that time forward all indigenous cultural groups were culturally oppressed and suppressed by one conqueror or another. Prohibitions and restrictions on practicing traditional ways persisted up to 1978, when indigenous cultural groups in the United States were finally granted the freedom to practice their traditional ways again with the American Indian Religious Freedom Act. Consequently, prohibitions against traditional ways are still in living memory for many cultural groups and over four hundred years of cultural loss and attrition have been added to the fragments of ancient oral histories that managed to survive. Today, indigenous cultural groups still struggle to retain what cultural traditions and plant knowledge remain and to regain and reconstruct what has been lost.

Many of the indigenous cultural groups that are still active in the CFO region do not measure their cultural "survival" based on whether or not they have a man-made reservation boundary drawn on a map of their traditional homelands or even upon being a federally recognized tribe. Such concepts and definitions did not exist when their cultural traditions arose and have nothing to do with traditional spiritual beliefs, ceremonies, teachings, or skills. Moreover, many indigenous cultural groups were never "given" reservation land or "granted" federal recognition—but their cultures did not suddenly "cease to exist" due to lack of a map boundary or a piece of paper. Consequently, many indigenous cultural groups still measure their cultural "survival" in a traditional way: whether or not one man or one woman still retains the cultural knowledge and wisdom of their People. As long as one "wisdom keeper" still lives, there is hope for their People and their culture still lives. As long as they and their descendants can still walk ancestral lands—or even just view a cultural site of significance from a distance—that land and that place is still a part of their living cultural tradition. Consequently, descendents of many indigenous cultural groups make regular pilgrimages to the CFO region to drive, walk, or view the lands, waters, plants, and animals of their ancestors and to share that lived cultural experience with their children, the future "wisdom keepers" of their People.

All the cultures that moved through and utilized the CFO region—whether indigenous, European, Hispanic, American, settler, pioneer, rancher, farmer, soldier, cowboy, or warrior—are "important" to the history and archeology of the CFO region, as are all the plants. The ancient and historic trails of many cultural groups overlapped and intersected in the CFO region and created choices and events that are often recorded on the landscape and in archeological sites. Each culture interacted with the landscape and plants of the CFO region in a different way and created a culturally distinct signature upon the landscape. Studying ancient and historic archeological sites—and the stone, animal, metal, or plant materials found at those sites—brings forward information about the ancient and historic past that can inform, enlighten, and clarify cultural understanding of ancestral heritages, traditions, and events for a wide range of cultural groups.

It is our hope that this book will help facilitate a stronger connection to the plants, history, archeology, cultures, and landscape of the CFO region for anyone, of any culture, that uses it.

after A.D. 1250, indicates that Late Formative peoples in far SENM were being drawn more tightly into a wider world that offered more than just economic opportunities. They were probably also attracted to religious ideas and symbols that originated far to the south in Mesoamerica (central Mexico, Yucatan, Belize, and Guatemala), and were circulating well up into the American Southwest where they were adopted by well-organized and powerful Pueblo societies. In the American Southwest, Mesoamerican themes and supernatural beings are evident in images found on rock art and some pottery vessels. Among the most important of these is Quezalcoatl, a Mesoamerican god who became especially prominent in Post-Classic times (A.D. 900 to the Spanish conquest). He is represented as a feathered serpent—an image found all the way across the southern United States—and is also associated with the jaguar. Another is Tlaloc, a Mesoamerican rain deity associated with sacred mountains. Also appearing in the Southwest are the Hero Twins, central figures in Mesoamerican mythological narratives that survived in a Mayan book called the *Popol Vuh* which was transcribed by an 18th-century Spanish Dominican friar living among the Maya. These religious elements were not simply copied by native peoples in the American Southwest, but rather were re-shaped and combined with indigenous beliefs and ceremonial practices to form locally and regionally distinct religions. This historical situation is similar to the one that played out in ancient times across a large swath of the Old World—from the eastern Mediterranean to India—where a wide variety of religions shared recurrent themes (the great flood, virgin birth of incarnate gods, divine beings existing as holy trinities, and many other shared elements).

Throughout prehistory and up to the present day, Native Americans in the region integrated the use of plants and plant-derived materials and substances into the rituals and ceremonies that permeated most aspects of their lives. The late prehistoric period was no exception, and certain practices documented among the Apache groups in historic times probably had their roots among late prehistoric village farmers. These include the use of black soot to paint a cross on the largest rock placed in the center of agave pits. Apache groups also painted a cross on the largest mescal crown using **cattail pollen**. Recent archaeological excavations at Fort Bliss found concentrations of cattail pollen in several rock-lined pits below burned-rock middens. The Apache also sprinkle young maidens with **corn pollen** during coming-of-age ceremonies that involve the collection and pit-baking of agave hearts. Excavations of burned-rock middens in the region have also found rock alignments corresponding to the four cardinal directions, consistent with practices reported by the Apache.

Crosses symbolize the four directions, which were highly charged with ideological meaning among all native peoples in the American Southwest. Such directional symbolism became very prominent in late prehistoric religions and associated iconography found on pottery vessels, rock art, and other artistic media. Moreover, directional symbolism influenced ritual performance and architectural layout within houses, kivas and other ceremonial structure, villages, and even the shrines placed across the landscape. However, caution must be used when extending cultural practices noted in modern times to ancient cultures as the recent displacement of native groups and the conquest and immigration of non-native peoples in the Southwest makes it difficult to accurately trace practices from antecedent archaeological cultures from modern ethnographic information.

Archaeological Context

Context is everything when doing archaeology, and archaeologists take special care when excavating sites. Recording and documenting the specific locations of all artifacts and samples is the only way that archaeologists can make sense of the archaeological record. Artifacts that come from the same stratigraphic context are presumed to come from the same time period. We group materials together by contexts that are the same, and separate those that are not the same. Plant materials are usually in association with other artifacts that have temporal information and are the plant remains themselves the target for radiocarbon dating. Therefore by carefully piecing together the contextual, artifactual, and temporally diagnostic information together we can interpret how archaeological materials were used in the past.

Native American Nomads after A.D. 1450: Post Formative and Later

The post-Formative begins with the widespread abandonment of late prehistoric villages in the southern Plains around A.D. 1450, as groups throughout the region shifted to a more nomadic, tipi-dwelling lifeway centered more squarely on bison hunting. Archaeologically, this period is somewhat of a phantom, as many of the distinctive, decorated ceramic types largely disappeared along with village sites. Ceramics are either absent in far SENM at this time or, to the extent they were still in use, consist of types that are largely unknown. Side-notched arrow points, similar to those that appeared after about A.D. 1250, continued into this period to an unknown date, and were eventually replaced by metal arrow points and firearms. Tipi rings—circular arrangements of stones used to weigh down and stabilize tipis' hide coverings—are now found in the region. Radiocarbon datable materials are not usually found in association with tipi rings, making them notoriously difficult to place in time, but most of those in SENM are probably from the Post-A.D. 1450 time frame.

The Pueblo-Plains interaction sphere continued unabated after A.D. 1450. The shift from village life to nomadic bison hunting by people living on the southern High Plains may have been a simple "business decision." In other words, people may have decided that **corn** farming was simply too much trouble, and that it made more economic sense to simply focus more on bison hunting, and get **corn** and much of what else they needed through trade with the pueblos to the west. To the north, this transition is fairly well documented as a result of years of careful, systematic excavations at two pueblo sites along the lowermost stretches of the Rio Hondo, and the later Garnsey Bison Kill and Camp sites southeast of Roswell and near the Pecos River. The Pueblo-Plains interaction sphere continued going strong into historic times, during which the Jumano, Apache, Comanche, and Hispanic *ciboleros* successively filled the role of bison hunters who supplied the pueblo and Spanish villagers of the Southwest with meat, hides, and other products from this most valuable of wild beasts.

But it is unclear to what extent post-A.D. 1450 people in far SENM were involved in the Pueblo-Plains interaction sphere. There is only one well-documented bison kill site in the region that dates from this time frame, and it involves only a single bison. The Pueblo societies of the El Paso phase and Casas Grandes—the mostly likely trading partners for bison hunters in the region—were finished by A.D. 1450 and their communities abandoned. The continued drop in radiocarbon dates into Post-Formative times in far SENM may indicate that many people moved out of the region, perhaps to the north where they would better positioned to trade with the pueblo communities that continued to thrive into this period.

When the earliest Spanish explorers entered the Southwest and southern Great Plains, they arrived in a world that had been substantially transformed over the preceding couple of centuries. On the western Plains they encountered "dog nomads"—tipi-dwelling, nomadic people who employed single dogs to drag loads of up to 30 kg on **pole**-framed structures known as *travois*. Native people on the Plains acquired horses beginning in the mid-16th century, and this allowed them to travel over much greater distances and haul heavier loads on *travois*, which were now attached to horses rather than dogs. Throughout most of the historic time frame, Euro-American exploration, settlement, and commercial activities occurred mostly along and beyond the margins of far SENM. As a result, far SENM remained a remote, little-known expanse. Apaches and Comanches successively dominated the region during historic times, up until their last, free-roaming members ran out of options and were finally subjugated in the late 19th century. As a result, far SENM was one of the last parts of the United States to be settled by people of non-native descent.

Native Americans have survived in SENM to present, many groups (like the Apache) have preserved and maintained a heritage and compendium of knowledge concerning plant use that extends back over 10,000 years. This includes the full spectrum of collection, processing, storage, consumption, and the attendant rituals that accompany these activities. Their continued practice of pit-baking agave, and its associated rituals including the use of cattail pollen, the pharmacopeia of medicinal plants, and other plant uses provides a living window onto the millennia-long traditions of Native Americans in far SENM. Therefore, when using the ethnographic record in this text we focus on their traditional plant use and experience, over other more far flung peoples. In the next chapter the techniques and data of plant use from the ethnographic and archaeological record will be presented, compared and contrasted.

Apache Cultural Plant Knowledge

Terri Gregston

According to the oral histories of several Apache cultural groups, the Apache groups regularly "gathered together" at various locations. One of the Apache "gather together" sites was located in the Guadalupe/CFO region and is claimed by several Apache groups as a culturally significant site.

During the gatherings, the Apache groups engaged in various social and cultural activities and exchanged information, ceremonies, and skills. It is likely that it was during these "gather together" events that the Apache cultural groups developed a certain amount of homogeneity in skill sets, plant uses, cultural attributes, and ceremonial aspects. This would account for the large number of shared cultural and ceremonial aspects between widely separated Apache cultural groups that were culturally distinct from other southern Athabaskan cultural groups. Since many of the Apache shared cultural traits were deeply imbedded in their oldest oral histories, ceremonies, and cultural ideologies, it indicates that the "gathering together" of Apache cultural groups and their mutually shared cultural traits began at some time in the distant past—after the southern Athabaskan collective had separated into different groups in the American southwest and prior to European First Contact.

One of the most predominant shared cultural traits amongst all the Apache cultural groups was a profound reverence for the natural world and all the components of that world, including: the earth, mountains, clouds, water, wind, fire, stone, soil, animals, plants, insects, sun, moon, and stars. While many North American indigenous cultural groups also had a high reverence for the natural world, the Apache were perhaps unique in the degree of asceticism that they culturally chose to follow in order to show their respect for the natural world. This aspect of Apache culture was so deeply ingrained that it was recorded in their oldest stories and ceremonies, pervaded their daily life, and was consistently held as a foundation of their cultural ideologies from prior to First Contact to today.

As John Lehmann recalled from his years spent living with the Apaches in Texas and New Mexico the 1870's:

> *"The Apache was ever mindful of the great Creator and stood in awe and reverence before all nature and the handiwork of god. He had no idea of Christianity but he bowed to every weed that he bent, every stream that he crossed and begged the pardon of every animal that he killed and always praised or implored the Great spirits after each chase, engagement, or war."* (Lehmann, 1927: xvii)

The Apache cultural reverence for plants extended into their daily activities, which combined Apache cultural, spiritual, and practical approaches to the natural world into a unique cultural approach to plant harvesting, preparation, and use:

> *"These [Apache] women did not merely take from the earth as needed. Instead they engaged in this economic practice in a way that intermingled with the spiritual. When gathering these necessities from the earth, Apache women*

Figure 42. Eastern escarpment of the Guadalupe Mountain Range. Photo by T. Gregston, 2017.

always prayed in thanks of the power that each food contained, as they did for all plant and animal resources that existed within their territory." (Watkinson, 2016: 40)

Plants were often prayed for prior to harvest, apologized to during the harvest, thanked during preparation, and blessed just before consumption as a daily way of life. The Apache, as a culture, were fully cognizant that their survival as a People was dependent upon the plants and resources of the natural world. As such, the Apache were astute conservationists and recognized the importance of sustaining viable wild plant populations for future generations of herd animals and all the living things in the natural world that also depended upon the plants. Apache cultural stories recant many morality tales about "greedy" People, who wantonly harvested plants or animals in the wrong way, and the ills that befell them for doing so. In Apache cultural traditions, one took only what was needed from the landscape with great respect and thanksgiving—and no more. It was considered a cultural taboo to overharvest a given plant or animal population to the extent that it harmed the long-term viability of that population to provide for future generations of all living things.

Cultural evidence also indicates that Apache cultural groups routinely practiced sustainable harvesting of wild plants. For example, the Mescalero harvested—and still harvest—agave plants in a labor-intensive manner that leaves the root intact rather than in a more expedient manner that would damage the root. Leaves cut from the crown are then laid upon the exposed root, to provide shade, moisture, and nutrients to the root. The root, in turn, produces a number of agave "pups" that grow into mature plants more readily than agave will produce new plants from seed. Similarly, the Chiricahua Apache would strip off and plant the seeds of sotol during sotol harvests to help ensure the next generation of sotol. While it is tempting to look at these efforts from an imposed European-based "economic" viewpoint, Apache cultural reasons for their efforts arose from a cultural drive to

Figure 43. An Apache woman harvests wheat. Photo by Edward S. Curtis, 1906, Library of Congress.

Figure 44. A dense 'forest' of sotol in bloom on the eastern escarpment of the Guadalupe range. Photo by T. Gregston, 2014.

participate in an equilateral "give away" exchange with the natural world. The plants "gave away" their lives to feed the Apache and their children. In acknowledgement of this great sacrifice, the Apache "gave away" their time, effort, prayer, and thanksgiving to ensure that the plants and plant children survived and thrived in turn—without thought of personal reward or return for that effort. It was a "give away" made freely regardless of whether or not the Apache cultural group would ever return to that site.

Due to their deep cultural reverence for the natural world, the Apache developed a very aesthetic cultural lifestyle that they viewed as "being in balance" with the natural world and that withdrew from the natural world only the resources needed to survive. In order to live in the wild with a minimum impact on the natural world, the Apache relied more upon their survival skills than material comforts and became astute and highly skilled naturalists. Apache cultural groups remained either moderately or highly nomadic and were able to observe and learn from vast landscapes, a wide range of natural resources, and many different cultural groups. When the Apache cultural groups "gathered together", they shared what they had learned.

For example, all of the desert Apache cultural groups utilized pit baking processes to convert tough and normally inedible plants like sotol, agave, lechuguilla, and other fibrous root plants into edible foods with high nutritional value. Knowledge of how to prepare these plants may have originally come from other indigenous cultural groups in the desert regions but over time these plant skills were fully integrated as desert Apache cultural plant knowledge. When the Apache cultural groups "gathered together" in the Guadalupe/CFO region where tough desert plants were a primary food resource, pit baking and desert plant preparation techniques were shared with Apache cultural groups that hailed from mountainous and non-desert regions. The preparation of food for large gatherings of people may also account for some of the pit baking rock middens that are found in the CFO region. When the Apache "gatherings" were held at other "gather together" sites, the plants and plant preparation skills of those areas would be conveyed to the desert Apache groups in turn.

The "sharing" of plants and plant skills gave the Apache cultural groups a much broader plant knowledge base of many different ecosystems than other more sedentary and agriculturally oriented cultural groups of the southwest. Travel to and from "gather together" sites as Apache family groups also culturally entrained knowledge of plant resources and travel routes across vast and frequently harsh landscapes. Plants were also a primary source of shelter, clothing, cordage, tools, artifacts, utensils, and fire for the nomadic Apache and the Apache had to be able to find these plant resources in different terrains, ecosystems, and plant communities. Combined, these plant skills enabled Apache cultural groups to survive, and survive well, in almost any landscape. This was a cultural skill set that was heavily relied upon and expanded during long hunting migrations.

While the Apache are best known to the general public as great hunters, the Apache culture did not just focus on prey animals to the exclusion of all else. Rather, the Apache saw prey animals as an extension and a result of everything else in the natural world, including: the landscape, the weather, the season, the soil, the water,

Figure 45. Apache cultural groups were renowned for their basketry skills. Basket materials might include: grass, willow, sumac, cottonwood, mulberry, squawberry, devil's claw, yucca root, yucca leaves, sotol, beargrass, cattail leaves, or any suitable and available basketry material. The famed Apache water basket, second from left, was made waterproof by coating the basket in piñon pine resin. Photo by Edward S. Curtis, 1907, Library of Congress.

the plants, other animals, and insects. In order to be good hunters, they had to know what each animal ate and where those plants or foods were located on the landscape and in which season. They also had to know how to track an animal over the most difficult of terrains and to successfully predict where and how the animal would move next. In order to track and successfully hunt an animal, one must know a great deal about animals as well as landscapes, weather, soil, stone, water sources, and plants.

The Apache were superior trackers and relied heavily on "plant signs" to track everything that moved across the landscape. A nibbled leaf or a bent blade of grass can reveal the identity of what animal or event created the nibble or the bend. It can also reveal the exact time

Figure 46. The yucca fireboard pictured below was excavated from a shelter cave in the CFO region. No carbon date is available but it is most likely a "teaching" fireboard used by a novice to learn the skill of making fire by friction with a bow drill. The "novice" level of the user is indicated by the irregularity of the notches and execution as well as the wide spacing between friction sockets. The Apache were masters of both the bow drill and the hand drill. Favorite fire making woods were yucca, sotol, lechuguilla, cottonwood, and cedar (juniper); however, a master fire maker could obtain a coal by friction from any suitable wood or plant stalk under any weather condition. Photograph by T. Gregston, 2013.

the leaf was nibbled and the blade bent—if one knows how each plant reacts when it is nibbled or bent. Each plant reacts differently to a "wound", heals the wound differently, and wilts and dies at a different rate. Each species of plant reacts differently and each individual plant within a species reacts differently—depending on the weather, soil moisture, soil type, shade, sun, season, time of day, and overall health or weakness of the plant. In order to read the "plant signs" left in the trail of a prey animal accurately and well, one must have a cornucopia of naturalist skills and also know a great deal about many different plants on a very intimate and detailed basis.

Medicinal plants found in different ecosystems and terrains also played an important role in nomadic Apache daily life. Since the health and lives of their People were highly dependent upon the aid of medicinal plants, Apache cultural reverence for medicinal plants was profound and their medicinal plant knowledge encompassed plants found in a wide range of terrains and ecosystems. Knowledge of common medicinal plants was shared widely with all group members so that everyone could care for their immediate health or wound needs even if separated from the main group. In some Apache cultural groups, highly skilled herbalists held and passed down specialized or advanced medicinal plant knowledge; whereas, medicine or holy people held and passed down cultural and spiritual "medicine" knowledge. Apache cultural groups held all medicinal plants in great reverence and took special care when approaching or harvesting medicinal plants in particular.

> *"All the real high, potent, sacred medicine that was used to heal come from that area…you couldn't go pick them unless you purified yourself and prayed, and then you could find [what you needed]. …That's why only the people that really knew about the medicine, prayed about it and sometimes the holy people, when they treated somebody that was sick they would be revealed unto them through revelation what kind of medicine was supposed to be used and that's what*

Figure 47. Cacti are very succulent plants with very strong self-healing properties. The juice of the cactus will form a transparent seal over a wound that serves as a "bandaid" to slow loss of moisture to the remaining plant. Although the animal sign on this rainbow cactus looks fresh due to the color, it is older than what it appears. Photo by T. Gregston, 2015.

Figure 48. The Apache collected pollen from cattail plants when the cattail spikes became dusted with yellow pollen. Favorite collection sites were carefully monitored because pollen is only present for a narrow window of time. Too early and there is no pollen; too late and the pollen has been dispersed in the winds. Left: A colony of cattail plants. Right: Harvested cattail pollen. Photos by T. Gregston, 2016.

they would prescribe and they got it themselves, the patient didn't. They knew, they were led to which one it is." (Toupal and Stoffle, 2004: 67)

Culturally important plant materials—particularly plant pollens—were heavily utilized in Apache prayers, blessings, healing rites, purification rituals, and important cultural ceremonies.

"Apache religion does not revolve around solely the largest entities of the natural world. Even the smallest of substances within the landscape can take on tremendous spiritual symbolism and power. Tule pollen, called hoddentin, marks the bodies of Apaches during much of their ceremonial practices. This yellow substance, carefully prepared by medicine men from the cattail plant at a particular point in the flora's lifespan, moves through Apache life and even death. Warriors would carry this symbol of the sun's life-giving power into battle and would use it in prayer at the bedsides of the dying. In combination with frequent prayers, the pollen could also be thrown into the four sacred directions to express gratitude for a good hunt or

Figure 49. Apache cultural groups had strong cultural and spiritual ideologies about the power, or "medicine", of "place". Each "place" had its own "medicine" that could be asked to help the People in a time of need. Similarly, the plants, stones, and water of a specific place had its own "medicine" that was a combination of both the material and the "place" where it resided. On a purely physical level, this cultural belief has some scientific validation: each "place" has a different mineral composition, which is also present in the water, stones, and plant materials found in that "place". Trace minerals conveyed to patients via water or plants play an important role in physical health, treatment of chronic conditions, and wound healing. Photo by T. Gregston, 2015.

battle won. In this manner, Apache, earth, life, death, sun and stars remained inextricably linked."(Watkinson, 2016: 37)

Pollen, particularly cattail pollen, was a ceremonial plant component of many Apache ceremonies and "blessings". It was used to bless people, places, and things. It was used heavily in the Apache girls' puberty ceremony as well as healing ceremonies and traditions. It was also used to bless plants prior to harvest and plant preparation processes such as the pit baking of agave and sotol. In addition to pollen, the Apache respected and utilized a wide range of culturally important plants, springs, and places in their cultural traditions and healing practices.

"There are herbs for healing, visions, birth, for sick people. There are not only herbs, but also sacred trees, sacred springs areas, ceremonial places." (Toupal and Stoffle, 2004: 64)

In their wide ranging travels, the Apache regularly interfaced and traded with cultural groups that lived in pueblos and that tended cultivated crops year-round. Through this interaction, the Apache were fully aware of how to build pueblo-style houses and how to farm in a year-round manner. Even so, the Apache would visit the pueblos and then return to the natural world—which was the foundation their cultural ideologies, teachings, ceremonies, and cultural way of life. The Apache perceived immersion in the natural world in an aesthetic, respectful way as the only way the Apache could stay intimately and spiritually connected to the natural world and continue to be taught the profound wisdoms that it held.

"If you grew up in the forest you know it…You have to live it to know. To be in the forest

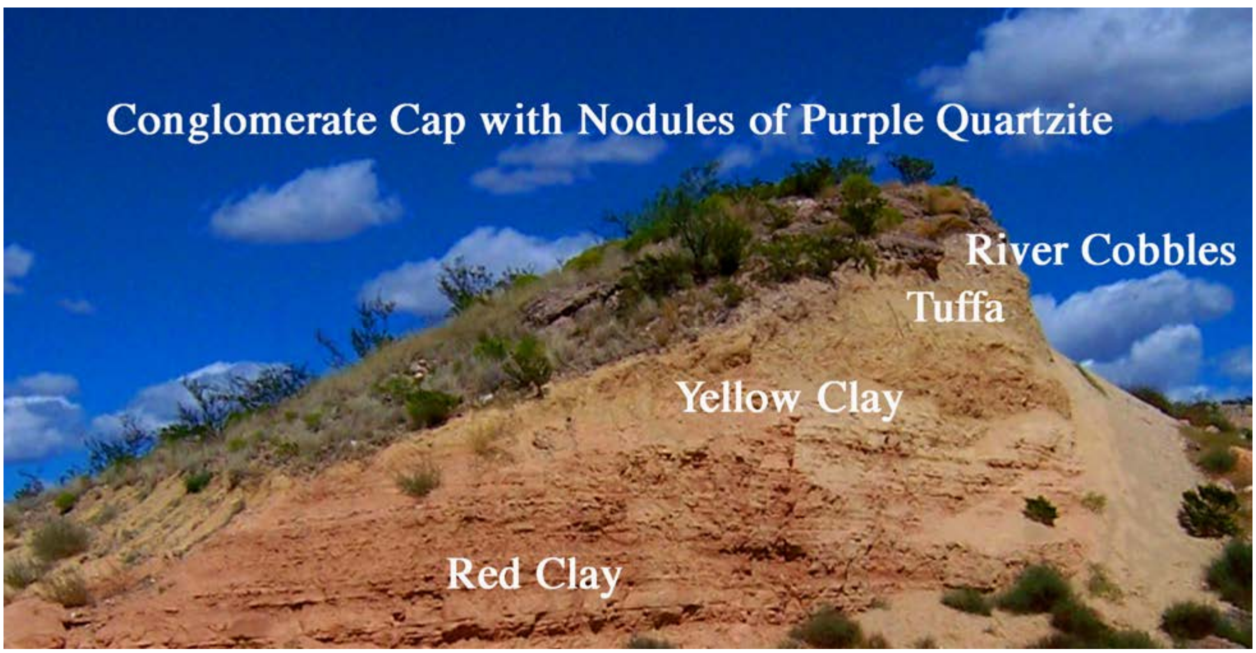


Figure 50. Apache cultural groups considered "mining" or digging for mineral materials a cultural taboo that unnecessarily damaged the natural world. However, if mineral materials were found on the surface, it was considered a gift from the Earth and could be thanked, blessed, and utilized if needed. This exposed river bluff on the Pecos River is rich with both practical and medicinal materials. Hard purple quartzite nodules found on the surface made excellent durable stone tools. The river cobbles could be used for cooking. The yellow and red clay, both of fine quality, could be used for paint, practical uses, or medicinal applications. Apache cultural groups often used different clays as "medicine" and administered clay "medicine" both externally and internally. Clay medicine was often mixed with different plant medicines in complex "formulas" that required specific preparation of each element to be effective. Different clays of different colors were collected from different places and were used to treat different ailments. Today, modern scientists have validated the medicinal properties of different clay materials and have found that the medicinal properties of clays found in specific regions can successfully treat bacterial infections that are drug resistant to modern pharmaceutical treatments. (Morrison, Misra, and Williams: 2016) Photo by T. Gregston, 2012.

Figure 51. Apache cultural groups were documented at First Contact as having an active cultural relationship with a number of eastern Pueblos. The Apache traveled to the Pueblos in family groups; used dog-drawn travois to transport materials; camped outside the pueblos, sometimes for extended periods of time; and arrived with dried buffalo meat, well tanned hides, salt, and other materials for trade. Due to an overdependence on corn and corn products, Pueblo groups sometimes suffered from "corn anemia". In that regard, the meat that the Apache groups brought to the pueblos could be considered "meat medicine" that the Pueblos needed far more than the Apache groups needed corn. There is cultural evidence that the Apache and some Pueblo groups had a close "extended family" relationship and sometimes intermarried. When their visit with the Pueblo was completed, the Apache would return to their nomadic travels. Photo of ruins at the eastern Pueblo of Quarai by T. Gregston, 2011.

> *everywhere…it's got to be part of you, it's got to be part of your heart."* (Toupal and Stoffle, 2004: 73-74)
>
> *"If you are there you hear the songs and you can be taught sometimes by the sacred plants. That's the only way."* (Toupal and Stoffle, 2004: 208)

Although Apache cultural groups eventually cultivated agricultural crops to greater or lesser degrees, many groups did so in the same manner that they tended plant populations in the wild. They would plant corn in the spring and then leave it. If the plants survived and corn was available when the group returned at harvest, then the group had some corn. If no corn survived, then "other things needed the corn more than the Apache" and the corn was a gift to those things that needed it more. The Apache had access to a wide range of plant and animal resources and did not "need" the corn in order to survive.

The Spanish were the first Europeans to invade Apache lands and to eventually turn the Apache against each other and against other cultural groups in a "divide and conquer" campaign that lasted for centuries. While the Spanish were never able to completely conquer the Apache cultural groups, Spain leveraged violence, Apache captives, and Apache slaves for Apache cooperation with Spanish conquest campaigns.

Apache cultural groups were heavily impacted by Spanish slavers, which continued to raid indigenous cultural groups for slaves even after the Spanish Crown ordered such activities to stop. Apache male slaves were used for hard labor duties and were often transported to northern and central Mexico to work in Spanish mines. Apache women and children were transported to Mexico City and other Spanish centers

Figure 52. The above painting, by Frederick Remington, depicts an indigenous guide leading the Francisco Vázquez de Coronado expedition as it passed through colonial New Mexico and on to the Great Plains. Spain relied heavily upon indigenous guides, which were often captive slaves that had been forced into that service against their will. For example, a captive Apache slave was forced to lead Diego de Vargas to the salt lake west of the Guadalupe Mountains in 1692 (Kessel and Hendricks, 1992).

to serve as household servants. Apache slaves were transported as far away as the Caribbean and overseas as laborers and servants. When the French entered into the conquest of the Americas, eastern Apache cultural groups also ended up in the French slave trade market. For the French slave trade market, Apache men were killed outright and only Apache women and children were funneled into the sex slave trade in Louisiana.

As other European powers moved into the New World, Spain stepped up its conquest campaigns to claim as much of the New World as possible and relied on Apache coerced cooperation on those campaigns, often leveraging captive family members for service. The Spanish never provisioned their Apache allies on Spanish conquest campaigns. Instead, the Apache had to provide their own weapons and forage for subsistence while fighting Spain's wars. The Apache were able to do so at a speed and efficiency that did not delay the campaigns no matter what terrain the campaigns crossed. Early Spanish accounts sometimes noted the Apache proficiency with plants and medicinal herbs. The following Spanish account from the 1700's is mostly likely of a Lipan Apache group located near the coast of Texas:

> *"Although the campaign is not very far from the hamlet, some of the [Apache] Indian women never quit going to war loaded down with bows and arrows as replacements, the others with gourds filled with water and all of them with some meat and wild fruits which are the munitions of war and mouth, they acting as sutlers…They are in charge, as well, of the field hospital, caring for the healing of the wounded, applying certain balsam herbs in a sublime degree, without doubt, and that only they know how to select and prepare.*

> *"Among the Apaches many examples have been seen by the troops of the presidios of an Indian, covered with wounds and his flesh torn, with only the remedy of chewing this herb, of swallowing part of it and applying the rest to the wounds, he presents himself after a short time with hardly any scars. In the internal provinces they give this precious vegetable balsam the name of herb of*

Figure 53. A group of Apache women at a river crossing. Photograph by Edward S. Curtis, Library of Congress image.

the Apache." (Santa Maria, 1766)

Apache medicinal plant and healing skills were so well known to other southwestern cultural groups that the Apache were sometimes called upon to assist with epidemic outbreaks in other cultures. In the following case, the Apache healer (most likely Jicarilla) assisted the Pueblo—despite the fact that the pueblos and the Spanish were "at war" with the Apache at the time and despite the presence of a deadly epidemic that put the healer's life at risk to enter the Pueblo.

> *"An Apache medicine man had been working at Abiquiu [pueblo], trying to cure the illness that was spreading throughout the community…the Apache was referred to as the son of El Canoso (the Gray-Headed One). Apparently he was a recognized healer who had met with some success in the past and had been summoned [by the Spanish priest and pueblo headmen] to help solve the problem of the illness at the pueblo."* (Ebright, 2006: 129)

As Spanish power in the New World waned, and other European and American powers moved into the southwest, the conquest of indigenous cultural groups continued. Many of the new conquerors simply duplicated the "Indian Relations" template developed by the Spanish: divide, conquer, and use violence or incarcerated family members to leverage indigenous cooperation in the conquest. Due to their skills and knowledge, Apache cultural groups were heavily recruited as scouts, trackers, and warriors in various war campaigns. Just as with the Spanish, the Apache had to provide their own weapons and provisions while on the campaigns and their own doctoring if they were injured. Again, Apache field doctoring with medicinal plants was sometimes documented:

> *"Victorio rode down a canyon, and under the cover of the smoke, he rode in among the soldiers waving his shield, and his brother, who was a prisoner of the Mexicans, jumped up behind him and they rode back to our men amid the cross-fire of the battle, but just as they reached our line a ball struck Victorio's brother in the back, passed through his body, went into Victorio's back and came out at his breast. The brother fell off the horse dead. Victorio turned and saw that his brother was past all earthly aid; he dismounted, placed the dead Indian on his horse, leaped up behind and rode on to our [Apache camp] headquarters. When he reached there he was covered in blood, and presented a horrible sight. He was given immediate attention, the wound was probed and bruised part cut away, and treated with a solution made from some kind of weed and clear water, and Victorio finally recovered, although the ball must have passed through his right lung."* (Lehmann, 1927: 54-55)

Waves of European epidemics continued to decimate

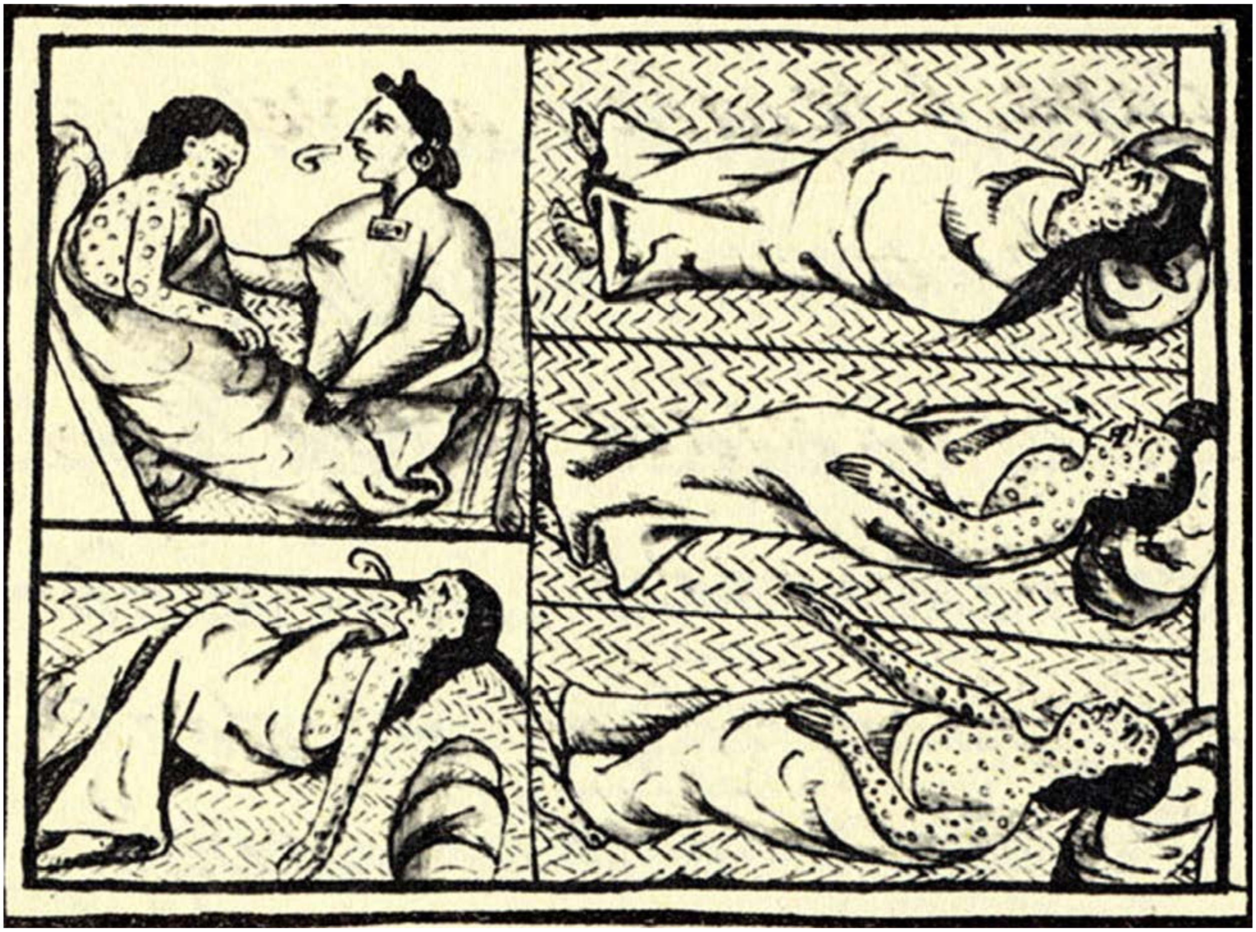


Figure 54. European diseases and epidemics decimated indigenous populations with fatality rates sometimes as high as 9 out of 10 people. European diseases were quickly spread across the countryside by indigenous traders and messengers, often far in advance of the actual arrival of the Europeans. Above: the Florentine Codex (1540-1585) documented a smallpox epidemic among the Nahua in Mexico. Public Domain image.

indigenous cultural groups and the Apache were not immune to the illnesses that so often sprang from the "white man's tracks". When illness struck their People, the Apache used traditional healing methods and their extensive medicinal plant knowledge to treat their People:

> *"Our people continued to die from the disease, and our medicine man seemed not to understand it, but one old Indian, a noted medicine man, went up on a high mountain and there he offered up his prayers to the Great Spirit to come to his aid in combating the pestilence. It was winter time, and despite the cold he spent the night on that mountain. The next morning when he returned to camp he commanded that a hole be dug near the river. When this was done, he ordered that big fires be made and large stones be heated. The stones were placed in an air-tight wigwam. The sick Indians were stripped and placed in the air-tight wigwam and sweated as long as they could stand it; then they were suddenly plunged into almost freezing water and kept there for several minutes, and when they were brought out the cold norther froze icicles on their hair. We then rubbed them with wet grass, and a rough blanket, wrapped them in warm buffalo robes and gave them a strong drink of hot, bitter tea. This tea was made from the root of a plant that is indigenous to this country, but I do not know the name of it. The sick ones were treated and the well ones had to undergo the same treatment, and then we moved our camp, the well ones carrying the sick ones. No more Indians died from that plague."* (Lehmann, 1927: 59-60)

Figure 55. The U.S. Boundary survey documented the presence of a number of Apache cultural groups encountered along the southern border of the United States. The above illustration of a Lipan Apache was included in the 1857 *Report on the United States and Mexican Boundary Survey, Volume 1* (Wendell, 1857).

The ability of Apache cultural groups to survive and thrive in any terrain and to doctor seemingly fatal wounds and illnesses with nothing but "weeds" baffled and infuriated the waves of European, American, and Mexican conquerors that attempted to subdue and wipe out the Apache. The seemingly magical ability of the Apache to disappear into the most inhospitable landscapes and traverse it at great speed—and survive quite well in the harshest of terrains—took on mythical proportions in some military accounts. Even when the wars against the Apache cultural groups were taking the final toll upon the Apache people, the Apache ability to survive well in almost any terrain—from Arizona, to Utah, to Mexico, to Kansas, to the eastern reaches of Texas—still completely baffled military officials.

In the 1860's, the Mescalero were removed from their traditional lands and force-marched to Fort Sumner, where they were subjected to inadequate rations, bad water, and waves of disease. John Carey Cremony conveyed this bafflement about the Apache ability to survive in any terrain to an Apache captive held at the Fort, and documented the Apache's response:

> *"How is it," said I, "that the Apaches contrive to live in places where there is neither game nor plunder?" The old man laughed heartily at my ignorance and simplicity, and replied:*
>
> *"There is food everywhere if one only knows how to find it. Let us go down to the field below, and I will show you."*
>
> *The distance was not more than six hundred yards, and we proceeded together. There appeared to be no herbage whatever on the spot. The earth was completely bare, and my inexperienced eyes could detect nothing. Stooped down he dug with his knife, about six inches deep, and soon unearthed a small root about the size of a large gooseberry. "Taste that," said he; I did, and found it excellent, somewhat resembling in flavor a raw sweet potato, but more palatable. He then pointed out to me a small dry stalk, no larger than an ordinary match, and half as long: "Wherever you find these," he added, "you will find potatoes." This was in October, and a few days afterward the field was covered with Indians digging these roots, of which they obtained large quantities. Pursuing the subject, Sons-in-jah said: "You see that big field of sun-flowers; well, they contain much food, for we take the seeds, reduce them to flour upon our metates and make it into cakes, which are very nice. Again: the mescal, which you white people would pass without notice, is convertible into excellent food by the simple process of roasting. Furthermore, we know exactly when, where and how to trap and catch small animals, like the prairie dogs, foxes, raccoons and others; besides which there are many plants containing nutriment of which you know nothing, or would not eat if you did."* (Cremony, 1868: 297)

Cremony's informant was over one hundred years old at the time of their conversation and was most likely Mescalero. Yet he retained in living memory plant skills and knowledge that had been garnered and passed down over centuries of time by the Apache People and that enabled the Apache, even while held in captivity at Fort Sumner, to find a way to survive.

Figure 56. Two Apache scouts were photographed at Apache Lake, Sierra Blanca range, Arizona, in 1873. Library of Congress image.

As Cremony travelled across the southwest, he interfaced with a large number of Apache cultural groups. The following portion of Cremony's account was not written about a specific Apache cultural group, but is instead a summary of what Cremony had learned from his interactions with all the Apache cultural groups that he had encountered:

> *"All travelers in Arizona and New Mexico are acquainted with the fact that if the grass be pressed down in a certain direction during the dry season, it will retain the impress and grow daily more and more yellow until the rainy season imparts new life and restores it to pristine vigor and greenness. The Apaches are so well versed in this style of signalizing that they can tell you, by the appearance of the grass, how many days have elapsed since it was trodden upon, whether the party consisted of Indians or whites, about how many there were, and, if Indians, to what particular tribe they belonged…The time which has elapsed since the passage of the party is determined by discoloration of the herbage and breaking off a few spires to ascertain the approximate amount of natural juice still left in the crushed grass. Numbers are arrived at by the multiplicity of tracks…*
>
> *"If a mounted party has been on the road, their numbers, quality and time of passage are determined with exactitude, as well as the precise sex and species of the animals ridden. The moment such a trail is fallen in with, they follow it eagerly, having nothing else to do, until they find some of the dung, which is immediately broken open, and from its moisture and other properties, the date of travel is arrived at nearly to a certainty, while the constituents almost invariably declare the region from which the party came. This last point depends upon whether the dung is composed of grama grass, barley and grass, corn, bunch grass, buffalo grass, sacaton, or any of the well known grasses of the country, for as they are chiefly produced in different districts, the fact of their presence in the dung shows precisely from what district the*

Figure 57. The above illustration shows some of the grasses mentioned in Cremony's narrative that grow in the CFO region. On the left are three grama grasses, followed by tobosa, sacaton, and four of the many bunchgrasses that grow in the region. Photos by T. Gregston, 2010.

animal last came..." (Cremony, 1868: 185-186)

Cremony's account is an extremely rare documentation of the extent and the exactitude of Apache cultural plant knowledge. The Apache not only knew each species of plant that a horse would forage, they could also still recognize each plant species even after it had been chewed up, digested, and passed through the intestinal tract of a horse. Even more remarkably, the Apache had an internalized landscape scale "plant distribution map" of where all the grasses and plants found in the dung grew. By combining detailed small-scale plant knowledge with landscape-scale plant distribution knowledge, the Apache could ascertain from where the horse had come and the cultural affiliation of its riders. The Apache knew plants so intimately and well that they could read the "plant track" and the "plant map" that the horse carried in its dung.

The location and status of potent medicinal plants and culturally significant plants was also an important part of the Apache "plant distribution map" that they carried as a culture. Rare, potent, and hard to find medicinal plants were "culturally remembered" and "visited", even when need for the plant was not required. The Apache regularly monitored and "tended" medicinal plant populations in remote locations to ensure the plants continued to thrive.

"Another old man who spoke about an old plant, a certain kind of plant that grows down there that I did not know the name of it. He told us to go to a certain area and see if it is still there. To see if there was plenty of it..." (Toupal and Stoffle, 2004: 206)

Unfortunately, most documentarians of the historic period cared little about Apache culture beyond what was encountered on the battlefield. Detailed accounts of Apache culture and plant knowledge are extremely rare in the historic period but the extent of Apache plant knowledge can sometimes be inferred from events documented in historic accounts.

In Ranald S. McKenzie's Red River campaign of 1874, Lipan Apache scouts employed on the campaign had to provide their own provisions and forage for subsistence while on the campaign. Although Apache plant knowledge is not specifically chronicled in the historic accounts of the campaign, the Lipan scouts successfully tracked and located the Comanche, foraged and hunted across a wide diversity of terrains and ecosystems, and performed both tasks with a speed and efficiency that kept pace with a fast moving and well-provisioned armed force (Robinson, 2013). In the 1880's, rogue

Figure 58. Between 1883 and 1887, A.F. Randall photographed a Chiricahua Apache medicine man and his family in a brush wickiup in Arizona. Public Domain image.

Lipan bands in northern Mexico successfully eluded Mexican pursuers and survived well in some of the harshest terrains in Mexico.

Chiricahua and Mimbreño Apache groups—especially those led by Victorio, Geronimo, Nana, Juh, and others—were extensively documented in the 1880's for their ability to survive and thrive in any terrain. Exploits of these Apache groups encompassed the Guadalupe region, central and southern New Mexico, Texas, and Mexico. Both American and Mexican pursuers were amazed at the Apaches' ability to survive in the harshest of terrains as well as their speed of mobility. The groups hunted, foraged, waged war, doctored the wounded, and rapidly traversed a wide diversity of terrains—and did all of this at a pace that stayed well ahead of well-provisioned troops. Similar historical accounts can also be found for the Mescalero, Jicarilla, White Mountain, and Western Apache cultural

Figure 59. This historic photo of Geronimo's Camp was taken in 1886. Public Domain image.

Figure 60. Chiricahua prisoners of war, including Geronimo, await transport by train to imprisonment at Fort Marion in Florida. Photograph by J. McDonald, National Archives Catalog.

groups—indicating that all the Apache cultural groups continued to place a high cultural value on cultural plant, animal, and landscape knowledge up through the end of the historic period.

Throughout it all, the Apache cultural groups periodically continued to "gather together", even though widely separated by great distances.

> *"We sent out scouts in all directions and called for the scattering bands of the Apache tribe to come together at a certain lake on the plains. Time was allowed for the members of the tribe who were in Arizona, Utah, and Mexico to come together."* (Lehmann, 1927: 52)

As the Apache Wars neared their end, the majority of the Apache cultural groups were rounded up and incarcerated on widely separated reservations. Some small Apache groups escaped the round up, scattered to remote regions, and used their skills to avoid contact with all other cultures. Some Apache assimilated into other cultures and hid the fact that they were Apache for generations out of fear of persecution.

Centuries of "divide and conquer" tactics had created divisions and wartime grudges amongst the Apache cultural groups that did not exist prior to First Contact. Even so, government officials still feared what would happen if the Apache cultural groups "broke out", "gathered together", and united. Firearms and weapons were prohibited. Practice of traditional ceremonies and travel off the reservations was prohibited, even as waves of starvation and disease swept through the reservations. Apache populations dwindled, with the very old and the very young being some of the first to succumb.

> *"In particular, the Apaches' imprisonment ensured that familiar medicinal herbs could not be collected and prepared for use before being*

Figure 61. An Apache sling could hurl a rock at sufficient speed to take out even large deer and humans. The sling is small, lightweight, and ammunition is found on the ground but it requires diligent practice to master. Photo by T. Gregston, 2012.

coupled with the spiritual ceremonies that were so integral to traditional healing." (Stockel, 1995: 62)

Ironically, even as the government forced the Apache to become civilized, the near starvation conditions on the reservations forced the Apache to resort to "primitive skills" that the Apache had used for centuries to survive. Unable to use weapons and firearms and prohibited from leaving the reservation to hunt big game, the Apache resorted to ancient hunting tools (Forsythe, c. 1963)—throwing sticks and Apache slings—to hunt small game within the reservation boundaries.

Confined to the reservations, the prodigious Apache knowledge of plants and ecosystems beyond the reservation boundaries rapidly vanished within a single generation. If one does not have access to the living plants, and experience working with those plants, plant knowledge is impossible to pass down to subsequent generations. Apache cultural groups that were fortunate enough to be granted reservation land within their traditional territory were far more successful at retaining traditional plant knowledge for plants found within the reservation boundary than Apache cultural groups that were displaced from their traditional lands and placed on distant reservations. Even so, with time and growing cultural attrition, cultural plant knowledge within the reservation boundaries also began to fade.

The Apache cultural groups that escaped the reservation roundups and continued to live in the wild retained and utilized Apache cultural plant knowledge the longest. Grenville Goodwin, a noted anthropologist of his time, collected details and stories about a group of "wild" Apaches that lived in the Sierra Madre in Mexico and went on several expeditions to locate them. In August 1927, Grenville wrote in his diary:

> *"Met Mr. Hoffman at this place [Pinon Trading Post, Navajo Reservation]. He was a former sheriff at Columbus, New Mexico, and is now chief of police on the Navajo Reservation…He says that in the Sierra Madre, south of the U.S. border, there is a band of about 30 Apaches who are still in a primitive condition. They live entirely in the mountains, and are unmolested by the Mexicans, who fear them. Occasionally, they come in to trade at some small town for ammunition, etc., but go right out again…*
>
> *"Mr. Hoffman says that one time while on a trip in the Sierra Madres, just south of the border, he ran into their camp. The Apaches were friendly, and he stayed with them 3 days while his horses rested up. They took good care of his horses, each day he asking them where the horses were, and the Apaches telling him. These people wore old time clothes, gee string and all. When Mr. Hoffman wanted to leave, they brought him his horses and gave him a message to take back to Apaches at San Carlos."* (Goodwin and Godwin, 2002: 19)

Groups of "wild" Apache were seen in the vicinity of the Mescalero Reservation as late as 1937. Accounts of first hand encounters with the Sierra Madre Apache that were still wearing traditional clothing occurred as late as 1948 (Goodwin and Goodwin, 2002: 19). Approximately 30 Apache families still lived in small camps in isolated areas in the Sierra Madre eighty years after the reservation era began. Goodwin's accounts document that the isolation in remote and "still wild" regions preserved traditional Apache living systems and cultural attributes well into the 20th century. His work also documents the growing difference between reservation Apaches and the 'wild' Apaches living in the Mexican wilderness.

Lipan oral accounts also recant that small groups of Lipan found refuge and continued to live in "the old way" in remote regions in Mexico and Arizona up through the 1950's and perhaps beyond. Evidence that the "wild" Lipan in Mexico continued to retain extensive cultural plant knowledge and to "share" that plant knowledge with others is found in a 1949 J. Frank Dobie account:

> *"In some ways Don Alberto Guajardo of Coahuila, Mexico, was the most interesting man of the*

Figure 62. An Edward S. Curtis photograph of an Apache mother and child was taken just after the turn of the century. Library of Congress image.

campo—the whole outdoors—that I have ever known. He knew more about native medicinal plants than a dozen curanderas—herb women… Always he asserted that the main contributor to his education had been an old Lipan

Indian." (Dobie, 2001: 91)

Apache reservation cultural groups were some of the last reservation cultural groups to be interviewed and documented by early ethnographers and anthropologists in the 1930's. By then, much of the Apache plant knowledge had already been lost. Aging Apaches were able to give Apache names for some plants located off the reservation, but researchers could not accurately identify the plants named without access to the plants.

In the last century, industrialization, urban sprawl, and human populations have expanded exponentially. Combined with commercial agriculture and livestock operations, wild plant populations have been radically changed or eradicated. Water tables have dropped, culturally significant springs have dried up, and much of the once vast Apache traditional landscape is now in private hands.

> *"In the past we stayed in the cold but if it rained or stormed, they would build a fire in the wikiup. Fire only in morning and evening to make food. In time, we got houses and stoves and got used to warmth. More houses and stove pipes and the heat goes up and drives the clouds and rain away. Rain and mountains used to be in balance. But so many houses spreading. People used to move around where they [the houses] used to be."* (Toupal and Stoffle, 2004: 70)

Today, many Apache cultural groups both on and off the reservation struggle to retain, regain, and pass down cultural plant knowledge to future generations so that it remains culturally viable.

> *"Medicine plants such as cedar bush; boil it and strain it when you are sick or have a cold…My children are not learning about this…"*
>
> *"I want to talk about place names, plants, herbs, all around the San Francisco Peaks, where we traveled. It is hard because we don't know all the herbs in our language in this high elevation around the San Francisco Peaks…"* (Toupal and Stoffle, 2004: 64-66)

Apache cultural plant knowledge arose from a profound cultural reverence for everything in the natural world combined with intimate and extended experience with plants found in the natural world. Consequently, learning and passing down Apache cultural plant knowledge requires extensive experience observing and working with plants in the natural world. In modern times, unemployment and poverty still plague many reservations. Many modern Apache must hold full time jobs off the reservation in order to feed their families and more time is spent in cars, houses, cultural centers, cities, universities, and corporations than in the wild. Apache youth of today are just like any other modern youth: increasingly absorbed in technology and modern entertainments rather than the natural world. This makes it increasingly difficult to pass down traditional ways and plant knowledge in modern times. As Apache Elders have said:

> "*You have to live it to know…it's got to be part of you, it's got to be part of your heart."* (Toupal and Stoffle, 2004: 73-74)

The extensive landscape scale "plant distribution" maps that the Apache cultural groups once held were perhaps the first plant knowledge to be lost with the advent of the reservation era and the fragmentation of the Apache into isolated groups. Even so, Apache Elders of today still recognize the value of knowing what grows where and still express the cultural desire to monitor, tend, and protect important plant populations for future generations:

> *"Probably an inventory of some real, so to say, potent plants ought to be undertaken to see in fact what we have here and that would be a cooperative effort on all the people that have ties to here. And then that way, we have kind of a sense of what's here and also be able to, if they begin to start disappearing, then maybe we should start doing something about it."* (Toupal and Stoffle, 2004: 70)

Apache Elders also still retain a great reverence for plants and emphasize the need for care and respect when working with medicinal plants:

> *"We would use plants, herbs and trees. You have to have respect. Early people know how to teach. We would use them for a reason. For medicine. People have to know, you can't just dig around for plants...use to say that you couldn't go pick them, you couldn't go pick them unless you purified yourself and prayed, and then you could find [what you needed]."*
>
> *"Looking for medicinal plants. We would not deplete it. We have our own ethics."* (Toupal and Stoffle, 2004: 67-70)

While many things have been lost and changed for the Apache in the last century, the fundamental components of Apache cultural ideologies that have been the backbone and foundation of Apache culture for centuries still somehow manage to survive in modern times. Although under siege from modern lifestyles and technology, respect for plants—and reverence and cultural conservation of medicinal plants—is still a part of the Apache living cultural ideology and cultural drive held by Apache Elders.

In modern times, wild plant populations are also under siege from the actions and choices of modern human beings and are disappearing at an alarming rate. Today, wild plant populations dwindle due to climate change and the resultant rise of insect populations, new plant diseases, and high intensity wildfires; disappear under the bulldozers and plows of urban, industrial, and commercial farming developments; die of thirst from lowered water tables and increasing drought cycles; and are over-harvested to the point of extinction for personal profit and gain. In many cases, it is difficult to determine what is being lost because modern human beings simply do not have landscape scale "plant distribution maps" or detailed plant inventories of what grows where, in what number, or in what health. In most cases, modern people don't know enough about plants and the role that each species plays in the health of key insect and animal species in an ecosystem to even make a determination about which plants are "critical" to the survival of that ecosystem.

"Our people respected the plants. If they took a branch…we would turn around and apologize. Same with the plants and animals." (Toupal and Stoffle, 2004: 73)

The separation of modern people from the natural world has created a condition that some researchers refer to as "plant blindness"—the inability to see or recognize individual plant species, which is coupled with a lack of care or concern about plant conservation. In essence, modern people do not "see" or care about wild plants because they have no personal connection to wild plants and no personal awareness of the vital role that wild plants play in the health and well being of the natural world and the human population. (Balding and Williams, 2016)

Ironically, what is most needed in modern times is intimate detailed plant knowledge, landscape scale plant distribution maps, and regular monitoring of plant populations and health—which is exactly what Apache cultural groups once did and held in living cultural memory as a way of life. Although civilizations, governments, and modern technologies have done their best to eradicate Apache traditional culture and beliefs, we have perhaps never been more in urgent need of historic and ancient Apache cultural plant knowledge and wisdoms than we are today.

Ethnobotany and Paleoethnobotany in Southeastern New Mexico

William T. Whitehead

The problem of understanding plant use in the past is approached via multiple methods and fields of study in archaeology. As we have seen in the previous chapter, the archaeology of SENM has a very long past, with some of the earliest human occupation evidence in North America. A summary of plant use will now be presented for the BLM-CFO area by describing the ways archaeologists collect data, how they construct a history of plant use, a brief summary of the archaeological and ethnobotanical literature, and what these sources really tell us about plant use in SENM. A coherent model of plant use will then be presented merging the archaeological, ethnographic, and botanical datasets previously presented. Appendixes of these datasets are provided in the back of this text for easy reference.

Paleoethnobotany

Archaeologists investigate plant use in the past by recovering and analyzing the plant remains from archaeological sites at the macroscopic (large enough to be seen with the eye or a hand lens), microscopic (use of low and high power microscopes) and the atomic level (specialized scientific instruments that can identify and quantify atoms, isotopes of atoms and molecules). This field is called **paleoethnobotany** or **archaeobotany**, a synthesis of techniques and methods archaeologists have either invented themselves or borrowed from other fields. Paleoethnobotany is different from **botany** (study of plants) and **ethnobotany** (study of modern human/ plant interactions) in that it focuses on the archaeological record, but it uses botany and ethnobotany as a basis for its scientific framework. This text is a prime example of paleoethnobotany in action, a combination of archaeological, botanical, and ethnographic studies.

The practice of paleoethnobotany is divided into several methodological areas: recovery and processing of samples, identification of plant parts, and data analysis. Pearsall (2000) is the most recent handbook on this field of study. Paleoethnobotanists aim to combine ancient data with historic and modern sources to extract the maximum amount of information from the archaeological materials collected. The goal is the most interesting part of our work: discovering and interpreting how ancient humans used plants and by extension, cultural behaviors and landscape utilization.

Because plant materials are not durable like rocks or pottery fragments, we rarely find large pieces of preserved or carbonized plants in archaeological sites. This is due to the perishable nature of plant materials and the mechanically destructive forces that act on plant remains in archaeological sites. Therefore,

> **Warning!!!**
>
> **Archaeological Resources are Protected!**
>
> The reader should be aware that archaeological sites are protected by federal and state law, with only licensed archaeological practitioners with permits from Tribal, Federal, and State agencies have permission to investigate and excavate sites on the lands they administer and oversee. We are all well aware that archaeological materials are an endangered resource, and there is a thriving market in artifacts from all time periods. Therefore specific site numbers and locations will be withheld in this text to protect the location of the archaeological resources.

Methods	Identification methods	Specificity of Information
Flotation of Soils	Low power microscopic magnification, comparisons with modern plant materials	Species level, good for quantification of genus and species representation.
Phytolith extraction	High power microscopic magnification, comparison to phytolith libraries	Class to genus, very difficult to identify species, quantification difficult.
Pollen extraction	High power microscopic magnification, comparison to pollen libraries	Class to genus, very difficult to identify species, quantification difficult.
Starch extraction	High power microscopic magnification, comparison to starch libraries	Class to family, difficult to identify genera or species, quantification extremely hard.

Table 3. Techniques used in to recover data in paleoethnobotany

paleoethnobotanists become experts in identifying portions of plants that are durable and preserve well in ancient archaeological sites such as carbonized plant parts, pollen, phytoliths, and in some cases starch grains. Each one of these types of materials needs a special recovery technique and laboratory processing method to isolate and concentrate the plant materials for analysis and identification (Table 3).

Macrobotanical techniques: To recover carbonized plant remains in most archaeological contexts, paleoethnobotanists use a water separation technique called **flotation**, named after the simple observation that carbon is lighter than water and carbonized plant remains float when submerged in water. Large samples of soil from culturally important parts of archaeological sites are bagged (from few ounces of sediment to many gallons) and "floated" in running water to remove the carbon. The floating carbon is caught in fine pore cloth or sieves and then dried. Whatever is left over, the heavy portion, is also dried and sorted for artifacts and carbon that didn't float. The dried carbon from the flotation sample is then taken to a laboratory and identified by a paleoethnobotanical specialist. The most diagnostic parts of a plant that can become carbonized are seeds, fruiting bodies and wood. Luckily for paleoethnobotanists these are the parts of plants that most cultures use as the major proportion of their plant use habits. The carbonized plant parts are sorted by type, identified to the lowest level of biological classification as possible (all the way from the kingdom to species level), counted, and entered into a database where the contextual information about the sample and the other archaeological information about the dig and artifacts is stored. This process is repeated for each sample taken from the archaeological site. If enough samples are taken from enough contexts a profile or interpretation of plant use can be formulated based on the species representation and the quantities of the plant remains present.

Figure 63. Example of a phytolith sheet from Scott-Cummings and Kováčik 2013.

Microbotanical techniques: To supplement carbonized macrobotanical plant recovery techniques, in contexts where macro-carbon is not found or would not have been preserved, microbotanical techniques are employed: phytolith, pollen and starch grain analysis. **Phytoliths** are small opal-silica mineral casts of the inside, outside, or intercellular spaces of plant cells (Figure 63). Phytoliths are made of minerals and preserve well in many contexts in archaeological sites. They are produced by many plants and because the shapes of some plant cells are specific to a group of plants or even a species, they can be recovered, isolated, and identified. Not all plants make phytoliths and some plants do not produce phytoliths that are specific enough in shape and size to be characteristic of a single species, so this technique should be used with specific cautions. Not many plants can be identified to species by phytoliths, and only a few can be identified to the family level.

Pollen is produced by all the flowering plants and gymnosperms and like phytoliths can be diagnostic from the kingdom to species level. Pollen is produced only in a specific time in the year, and in the flowering/fruiting parts of the plant. The outer wall of a pollen grain is made of a remarkably durable protein (**sporopollenin**) that can survive the rigors of the outside world and protect the pollen cell it encases. Pollen is concentrated, identified and counted like phytoliths and a pollen count profile is produced for each sample. One difficultly with pollen analysis in archaeological studies is that many species of plants produce wind-borne pollen and any sample should have a fraction of pollen that is not from direct human use but blown in from the environment. Also, since most cultures concentrate on using the fruit, tubers, stems, wood and more durable portions of plants, not the flowers where pollen is produced, studying direct human plant use from pollen identification is not possible in most archaeological sites. However pollen is useful if put into a larger context of the environment and area around a site.

Starch grains are produced as a carbohydrate storage vessel in many plants. Humans collect, process, and eat this starch as an energy source. Starch grains can be preserved in archaeological sites in special contexts such as in the crevices of stone tools and pottery, and can survive for thousands of years. The collection of starch grains requires a different set of processing techniques from phytoliths and pollen. Starch grains are not as diagnostic as phytoliths or pollen but can be specific to a family or genus. Even though it is not specific, starch grain analysis can be useful if one is looking for a group of plants in an environment. Starch grain analysis is most often performed on tools that were used to process plants or in ceramics or artifacts that have come into direct contact with plant materials.

Ideally, we would want to identify every plant part recovered from an archaeological sample to the species level. Unfortunately, in most cases, the paleoethnobotanist can only identify parts to a more generic level of taxonomic classification above the species, such as the genus, family, or higher. This is why large numbers of samples and grouping together information from many sites is needed to interpret plant use in the archaeological record. Frequently we have to refer to plant use from modern/historic groups to fill in the gaps in the archaeological record. This is done by ethnobotanical analysis, which will now be presented and summarized for the CFO region. We will then return to the archaeological record and compare historic and archaeological information.

Ethnobotany

Ethnobotany is the study of human and plant interactions. It is a broad and diverse field covering all cultures across the globe and divided into many subspecialties such as ethno-medicine, ethno-pharmacology, ethno-agriculture, ethno-classification, and many others. This manual is most concerned with the earliest ethnobotanical studies, with direct observation and recording of uses for plants by indigenous peoples in the recent past.

For SENM, many sources of historic-ethnobotanical information from Native American groups have been recorded. The Mescalero Apache are one such group that have a significant amount of historic information available, documented primarily by Edward Castetter and a small group of researchers in the 1930s and 40s. The University of New Mexico published this group's findings in a set of seven reports in the series, *Ethnobiological Studies in the American Southwest*. Two Apache groups are specifically covered in volume *III. The Ethnobotany of the Chiracahua and Mescalero Apache* (Castetter and Opler 1936), in which they reported on over one hundred species of plants as being utilized by these groups. The Lipan Apache were covered in unpublished notes by Opler (1936) available from Cornell University. The Plains Apache have a comprehensive text by Jordan (2008). Note that not all species reported in these texts occur in the CFO region, the focus of this work. Other texts on ethnobotany in Southeast New Mexico area derivative works, focusing on the multifaceted aspects of Native American culture and history with botanical references taken from a few primary sources (for

Family	Artifacts	Cooking	Dye	Food	Fuel	Medicine
Asteraceae (Sunflower)	1	1	4	9		25
Agavaceae (Agave)	12	1	1	12		2
Fabaceae (Bean)	2			12	5	9
Cupressaceae (Juniper)	3			10	3	11
Poaceae (Grass)	6	2		8		7
Pinaceae (Pine)	6			8	2	4
Liliaceae (Lilly)	6	2		9		2
Cactaceae (Cactus)	1			10		7
Rosaceae (Rose)	3		1	7	1	5
Chenopodiaceae (Spinach)	1			10		5
Fagaceae (Oak)	8			4	1	3
Anacardiaceae (Sumac)	4			6		3
Salicaceae (Willow)	5			3		3
Brassicaceae (Mustard)				3		5
Solanaceae (Potato)				4		4
Lamiaceae (Mint)				2		6
Berberidaceae (Barberry)			2	2		3
Amaranthaceae (Pigweed)				5		2
Pedaliaceae (Sesame)	1		1	2		2
Fouquieriaceae (Ocotillo)	3				2	2
Cucurbitaceae (Squash)				4		2
Moraceae (Mulberry)	2		1	2		1
Typhaceae (Cattail)	1			4		1
Asclepiadaceae (Milkweed)	1			4		
Onagraceae (Primrose)				4		1
Ulmaceae (Ash)	2			3		
Juglandaceae (Hickory)			2	2		
Nyctaginaceae (Verbena)				1		3
Orobanchaceae (Four O'Clock)			1	2		1
Plantaginaceae (Plantago)				2		1
Sapindaceae (Soapberry)	2					1
Commelinaceae (Day Flower)				2		1
Malvaceae (Mallow)				3		
Scrophulariaceae (Figworts)				1		2
Ephedraceae (Mormon Tea)				1	1	1
Polygonaceae (Buckwheat)			1	1		1
Euphorbiaceae (Euphorb)						2
Boraginaceae (Borage)				1		1
Apiaceae (Celery)				2		
Loasaceae (Loasa)				1		1
Zygophyllaceae (Caltrop)						2
Rhamnaceae (Buckthorn)				2		
Krameriaceae (Ratany)			1			1
Cyperaceae (Sedge)				1		
Pteridaceae (Fern)				1		
Equisetaceae (Horsetail)						1
Bignoniaceae (Bignonia)	1					
Juncaceae (Rush)				1		
Vitaceae (Grape)				1		
Portulacaceae (Portulaca)				1		
Papaveraceae (Poppy)						1
Total	71	6	15	173	15	135

Table 4. Summary of major use categories by plant family, with the recorded number of specific uses for the Lipan, Mescalero, and Plains Apache.

example see Opler [1983] or Basehart [1960]).

Most researchers when creating compendiums of plant uses lump many distinct Native American groups together, and while it is common to list the specific culture it can be confusing or difficult to tease this information apart. Modern efforts to synthesize ethnobotanical information, which most ethnobotanical researchers now rely on, have been made by Daniel Moerman. His comprehensive encyclopedia of plant use covers most of Native North America and is available in book form (Moerman 1998), and as an online searchable database (herb.umd.umich.edu). Of more regional interest are books by Tull (2013), Nabhan (1987), Dunmire and Tierney (1977), Yetman (2009), and Moore (2003); these texts cover large sections of the United States and the Southwest.

If we focus in on the available literature, the list of plants used in recent historic times varies by researcher and source, but if we combine the primary resources we find 451 individual uses of 115 plant taxa as present in the ethnobotanical literature (Castetter and Opler 1936, Opler 1936, Basehart 1960, and Bell and Castetter 1941). Table 4 summarizes the data by plant family, and sorted by total number of uses.

Many plants were important for food, material culture, and medicine, one example is the **Agave** family (sotol, yucca, mescal). For example, the Mescalero Apache were given that name by English speakers based on their extensive use of the Mescal Agave as a food, fuel, tool, fiber, and ritual plant. Other plant families with many recorded uses, not only in the CFO but in the Greater Southwest are legumes, cacti, roses, grasses, sunflowers, oaks, pines and junipers. The most common plant uses recorded from Native American groups in the CFO are for food, utility/ceremony, medicine/drug, fiber, and dyes. Every plant family listed in this has some food use, with 25 families only being used for food; most families have species with multiple uses. When looking at specific uses of plants in the five broad categories the most important are food related, with generic or not specified specific uses, fruits, bread and cakes, dried food, spices, beverages, vegetables and preserves. Containers and ceremonial items are also important, with tools, dyes, and medicinal uses in the extended list. Plant use by species will be covered in Part II of this text.

With a brief summary of the ethnographic literature, and an understanding of the ecology, paleoecology, and botany from the previous chapters we can now turn to summarizing the archaeological literature.

Archaeological Plant Use

As stated in the previous section, archaeologists use paleoethnobotany to understand ancient plant utilization, merging botany, ethnography and archaeology into one interpretive framework. The paleoethnobotany of the CFO can be found scattered in dozens of reports completed by archaeologists over the last century. Plant use was not an important topic of study until the later part of the 20th century, and most excavations before the 1980s did not make plant recovery and analysis a priority. Therefore, even though some very important sites have been excavated, little is known about plant use in most of them because the samples needed to accomplish this task were never collected. In the last decade the BLM-CFO archaeological management program has invested much time and effort into collecting plant data from archaeological sites; the result is a growing database of 366 sites with botanical remains reported as of 2015. The bulk of the data used for this analysis comes from

Identification Category	Total
Gymnosperm	
Leaf	
Root	0.6%
Seed	1.2%
Twig	0.4%
Wood	3.8%
Monocot	
Caryopsis	0.4%
Cupule	0.2%
Kernel	0.2%
Leaf Base	**13.7%**
Stem	0.6%
Dicot	
Acorn cap	0.6%
Fruit	0.2%
Perisperm	0.4%
Seed	**7.9%**
Thorn	0.2%
Twig	5.6%
Wood	**97.7%**
Monocot/Dicot	
Bud	0.2%
Periderm	0.8%
seed	0.4%
Stem	0.2%
Tissue	1.4%
Vascular Bundle	0.2%
Vitrified Tissue	0.8%

Table 5: Plant parts found in the archaeological record, shown as a percentage of sites with plant part.

Botanical Nomenclature	Common Name/Definition	Potential Uses
Gymnosperm	"Naked Seed" – Conifers, Cycads, Gink-os and Gnetales	
Cupressaceae	Juniper and Redwood plant family	
Juniperus	Juniper genus	Fuel, Food, Timber
Pinaceae	Pine Family	
Pinus	Pine genus	Fuel, Food, Timber
Monocot	Plants with one cotyledon or seed leaf	
Alismataceae	Arrowhead Family	
Sagittaria	Arrowhead genus	Food
Agavaceae	Agave and Asparagus family	
Yucca	Yucca genus	Food, Fiber
Commelinaceae	Dayflower or Spiderwort family	
Commelina	Dayflower genus	Food
Poaceae	Grass Family	
Muhlenbergia	Muhly grass genus	Livestock fodder, weaving, tools, food
Phalaris	Canary grass genus	Food (Gila River Area)
Phragmites	Reed grass genus	Medicine, tools, weaving
Stipa (Achnatherum)	Feather, Needle, or Spear grass genus	No uses documented
Sporobolus	Dropseed grass genus	Food, tools, weaving, fodder
Zea mays	Corn	Food, weaving, tools, fodder, medicine
Setaria	Foxtail or Bristle grass genus	Food

Table 6. Plants found in macrobotanical samples for all time periods in Southeast New Mexico.

Continued on next page...

the work done by PaleoResearch Institute (PRI) under the direction of the BLM-CFO (Cummings and Kováčik 2013). The project completed three types of analysis: radiocarbon dating (533 samples), macrobotanical analysis and microbotanical analysis from soil/flotation (504 samples) taken from 256 archaeological sites. Additional paleoethnobotanical data from 110 sites come from a synthesis of excavation reports and site files culled from more than 8000 sites managed by the BLM-CFO. The work from PRI can be exactly correlated to archaeological time period, and there is a perfect correspondence between all three phases of their data collection. The 110 sites that supplement this dataset do not have this level of temporal or methodological detail and therefore we can only talk about this data in terms of presence/absence for an archaeological site.

Macrobotanical Remains

To date, archaeologists have found 19 plant families, and 32 genera of plants from all time periods from prehistoric archaeological sites in SENM. Table 6 provides a summary and a glossary of the botanical name/nomenclature of these plants, with the common name and typical uses of each taxa. If we accept the assumption that the majority of carbonized plant materials are from cultural activities in the past, the total number of taxa found in the archaeological record is at most approximately 11 percent of the conservatively-estimated 300 species of plants found in the study area (Flynn 2015). The percentage of sites with a particular plant part is given in Table 5. As can be seen, almost all sites in the CFO region investigated for this dataset have carbonized wood, if they have any carbon remains at all, and the majority of this wood is from mesquite. Remains from agaves are only found in 13.7 percent of all sites, and seeds of plants of all types are only found in 7.9 percent of all sites. This leaves us with a minimal data set to interpret, but if we shift our focus to what we have we can make some broad interpretations of plant use in the past. Table 9 gives a summary of the plant taxa found in the CFO region by time period.

One of the primary problems we face with food ways reconstruction is the lack of large-volume trash dumps and middens from these mostly short term, ephemeral occupations that make up the vast majority of the sites in the study area and in far SENM. Even though many of these sites cover large areas, from many repeated occupations, each occupation episode was small-scale and short-term. There may not have been any food-

Botanical Nomenclature	Common Name/Definition	Potential Uses
Dicot	Plants with two cotyledons	
Amaranthaceae	Amaranths	
Atriplex	Saltbush	
Atriplex canescens	Fourwing saltbush	Medicine, food, dye, tools
Cheno-am	Chenopodium/Amaranth	
Chenopodium	Lambsquarters	Medicine, food, dye, tools
Krascheninnikovia	Winterfat	Medicine, fodder, ceremony
Anacardiaceae	Cashew or Sumac	
Rhus	Sumac	Food, medicine, dye, smoke
Asteraceae	Aster, Composite, Sunflower and Daisy	
Artemisia	Sagebush and Wormwood	Medicine, beverage, spice
Helianthus	Sunflower	Food
Cactaceae	Cactus	
Cylindropuntia	Cholla cactus	No known uses, possibly food
Echinocereus	"Hedgehog" cactus	Food
Opuntia	Prickly Pear cactus	Medicine and food
Euphorbiaceae	Spurge	
Acalypha	Copperleaf	Possible medicine
Chamaesyce (Euphorbia)	Spurge	Possible medicine
Fabaceae	Bean	
Acacia constricta	Whitethorn Acacia	Food, tools, fuel, building material
Prosopis	Mesquite	
Prosopis glandulosa	Honey mesquite	Food, tools, fuel, building material
Fagaceae	Beech and Oak	
Quercus	Oak	Food, tools, fuel, building material
Molluginaceae	Carpetweed	
Mollugo	Carpetweed	No known uses
Portulacaceae	Purslane	
Portulaca	Purslane or Pigweed	Food
Rhamnaceae	Buckthorn	
Rhamnus/Frangula	Buckthorn	Medicine
Rosaceae	Rose	
Solanaceae	Nightshade	
Solanum	Nightshade	
Zygophyllaceae	Caltrop	
Larrea tridentata	Creosote Bush	Medicine, tools, building material
Violaceae	Violet	
Vitaceae	Grave Vine	Fruit, cordage

Table 6. Plants found in macrobotanical samples for all time periods in Southeast New Mexico.

...Continued from previous page.

processing activities in the immediate vicinity of many of the sampled features, or if there were these activities were not sustained to the point that plant-food parts accumulated in sufficient quantities that they stood a good chance of getting charred and ending up in the fill of nearby features. As a result, we are faced here with a low probability of recovering plant food remains, and that indeed is the case for SENM. These general conditions, relating to these kinds of sites, was already well known prior to this project (see O'Laughlin and Lundquist 2012:279-281), and this current study and dataset simply confirm this broad-scale pattern.

The Problem of Preservation

Most archaeologists would love to have every item of material culture preserved , left in the location it was used, and in a large enough quantities to give statistical meaning to the finds in a site. We almost never find this when we investigate sites. The majority of sites in the CFO area are open air sites that are exposed to wind, water, and the sun; all highly destructive to plants remains. However, in a few locations we can find well preserved materials in the exact location they were left, such as caves and dry rock shelters. There are a few places in the CFO area that have caves where organic materials have survived and allow us to see a rare glimpse into the past. This text will highlight a few of these locations, discuss why they are important to understanding the past, document and why they should be protected.

Of the potential plant-food remains, those from economic staples are a minor subset, and are thus even rarer in the dataset. These include plants like corn, mesquite (seeds and pods), and yucca, which show up in low frequencies. Across the entire data set, one species has a high ubiquity across all time periods, and that is mesquite (Prosopis spp.). In some time periods a few species become abundant by ubiquity, but there is no strong trend or outliers that would suggest a major shift or change in emphasis in plant resource utilization. Mesquite seed fragments are present in only 2 percent of all samples, which seems unexpectedly low given the ethnographic evidence for abundant use of mesquite pods, and that our most identified macrobotanical remains are mesquite wood. Yucca leaves are the best represented of all potential food remains. These may or may not be from yucca processing for food, but used as fuel, however we will consider them as food evidence. Other edible plant parts show up in low quantities, such as Juniper seed, dropseed, sumac seeds, *Atriplex*, *Chenopodium* seeds, cactus seeds, Euphorbiaceae seeds, *Mollugo*, *Portulaca*, and *Rhamnus* seeds. In the dataset, only one of the site samples contains charred corn, specifically 347 cupules and four kernels in one of three samples from the Merchant Site. This suggests there may have been an appreciable measure of corn dependence at this site. Corn phytoliths were identified in this same sample, but also in 11 other sites that had no macrobotanical corn.

Microbotanical Remains

The microbotanical data will be presented in three parts: starch, phytolith and pollen data. Traditionally, these three material types are derived from three distinct types of extraction techniques from soils and artifacts (Pearsall 2000, pp. 178-182 for starch, pp. 411-435 for phytoliths).

Phytoliths: The phytolith dataset consists of identifications ranging from species (for example, Zea mays) to the subphyla (for example, Monocot) level of taxonomic classification. The less specific (i.e., the higher taxonomic-level identifications) must be because the phytolith could have come from a range of dozens to hundreds of species. The phytolith data are presented as groups of phytoliths coming from a species, genus, family, or higher-level botanical category. There are 68 identification categories, with 10 of those coming from the genus or species level of classification, and 58 categories that are no more specific than the family or subphyla levels, or an unknown plant category. The distinctive categories are Pinus, *Commelina dianthifolia* and C. *erecta*, *Muhlenbergia*, *Phalaris*, *Phragmites*, *Stipa*, *Zea mays*, *Artemisia*, and *Quercus*. These types show up in low levels across the dataset, except for *Commelina erecta* (dayflower), which appears in significant numbers in all time periods and sites. This finding of *Commelina erecta* in a large number of samples, is most likely due to its ability to be identified at the species level, and not because it was an important specific resource used by archaeological groups. The bulk of the phytoliths come from nonspecific grasses, which are a dominant plant group in the area. Grasses also produce phytoliths in quantity. The phytolith dataset does not give much information about specific plant use for individual sites, but when taken as a whole some patterns may be discerned.

The Problem with Identification

The process of identifying plant remains, both macrobotanical and microbotanical, is time consuming and in most cases non-specific. Most identifications of charred, fragmented, and microscopic plant parts are at a generic level of specificity. For example, there are many species of plants that produce wood, but without the preservation of key anatomical characters, the paleoethnobotanical expert cannot identify that wood beyond a very basic level of certainty, such as to the family level of identification. If Pinus strobiformis was used by ancient people and then turned to charcoal, the most trained expert may only be able to identify that wood to being from a gymnosperm if it was burned while green (which causes cells to explode), highly fragmented (large pieces of wood are needed for positive identification), or from abnormal anatomy. These conditions are true for most plant parts (seeds, fibers, leaves, stems, thorns) the structures that make up plants are highly characteristic while fresh but lose most of those characters when carbonized and preserved in an archaeological site.

Starch data: Plants produce starch (a polysaccharide) as a storage macromolecule, and this is used by humans as an energy source. Through digestion starch is broken down into sugars and these molecules are what is used by the body. Starch can be found in plant storage organs such as roots, fruits, nuts, seeds, and stems. Most starches are made more palatable by cooking, especially starches that occur in large storage organs such as roots and tubers, since large amounts of starch need to be predigested/broken down with water and heat for the body to more effectively use them.

We find three genus-specific starch identifications, *Setaria,* Sagittaria*,* and *Solanum*, two of which occur in SENM (*Sagittaria* is found primarily in the northwestern portions of the state), and have been known to be used by humans in the past (Table 7). *Setaria* is a foxtail grass, and is not known to have been used by native peoples in the study area. *Sagittaria* is a tuber-bearing plant, occurring in marshy areas, and its presence could indicate the presence of nearby wetlands in the past. *Solanum* is a nightshade tuber and may have been used by native peoples. The locations of the *Sagittaria*-bearing samples may be evidence of localized growth of this plant, and its utilization by humans. The rest of the identifications come from unknown *Poaceae* (grass) sources, which can be explained by the high ubiquity of grasses in the environment, human use, and the presence of non-carbonized grass seeds in the soils.

Pollen: While pollen is not normally associated with direct human activities, it can be used to pinpoint specific species and give an overall indication of the environmental setting. There have been many sites with pollen analysis but the counts are very low and the species diversity is also low in comparison to the number of taxa in the environment. Table 8 shows a summary of pollen types found in SENM. While a suggestion of *Zea mays* pollen has been made, a firm identification from SENM has not been confirmed. In SENM pollen analysis has been the least useful type of analysis for identifying plant use in archaeological sites.

Merging the Ethnobotanical and Archaeological: A New Model of Plant use in Southeastern New Mexico

Ultimately, a broad interpretation of plant use in SENM, by time period, is one of the goals of the archaeological program of the BLM-CFO. If we look at overall patterns (see Table 9), we can see that yucca is a very common resource from the Late Archaic to the Late Formative (showing up in over ten percent of the samples by time period), a finding previously emphasized by Simpson (2010). Juniper becomes more common through time beginning in the Early Formative. Most grasses are common to rare, showing up in all three classes of botanicals materials

Identification Category	Early Archaic	Middle Archaic	Late Archaic	Early Formative	Late Formative	Grand Total
Number of Samples	18	8	115	271	80	504
Monocot (One Cotyledon)						
Setaria (Foxtail)						
Starch grain				1		1
Unknown						
Angular Starch Grain		1	7	18	1	27
Cooked Amorphous Starch Grain			1			1
Eccentric small Starch				1		1
Eccentric Starch		1	1			2
Lenticular Starch	1		7	12	3	23
Root Starch			1	3	1	5
Seed Starch	2		4	19	5	30
Sub-Angular Starch	3	2	22	85	19	131
Dicot						
Sagittaria (Arrowhead)						
Root Starch				4	1	5
Solanum (Nightshade)						
Root Starch			1			1
Total	6	4	44	143	30	227

Table 7: Number of starch grains recovered by type and time period.

Taxa
Gymnosperm (Naked Seed)
Cupressaceae (Junipers)
Juniperus (Juniper)
Pinaceae (Pine)
Pinus (Pine)
Ephedraceae (Mormon Tea)
Ephedra (Mormon Tea)
Monocot (One Cotyledon)
Poaceae (Grass)
Typhaceae (Cat Tail)
Typha (Cat Tail)
Dicot (Two Cotyledons)
Amaranthaceae (Amaranth)
Apiaceae (Celery)
Asteraceae (Sunflower)
Artemesia (Sagebrush)
Brassicaceae (Mustard)
Cactaceae (Cactus)
Cylindropuntia (Cholla)
Opuntia (Prickly Pear)
Fabaceae (Bean)
Prosopis (Mesquite)
Fagaceae (Oak)
Quercus (Oak)
Polygonaceae (Buckwheat)
Eriogonum (Annual Buckwheat)
Geraniaceae (Geranium)
Erodium (Filarees)
Polemoniaceae (Phlox)
Phlox (Phlox)
Nyctaginaceae (Verbena)

Table 8: Pollen types found in SENM archaeological sites, listed by family and genus.

(carbonized macrobotanical, phytoliths, and starch). One outstanding sample from a site 10 miles east of Loving, NM has a small cache of carbonized dropseed (*Sporobolus* sp.), with 150 recovered, but this is only one of two sites with carbonized dropseed present (the other a site 8 miles east of Red Bluff Draw, with 2 dropseeds present). Dropseed has been documented as being used by the Mescalero Apache, collected, threshed, boiled and then eaten as a porridge or dried and ground into a flour for baking into bread (Castetter and Opler 1936, pg. 48). Mesquite-pod use is common in the Formative and later, but not seen in the Archaic.

Corn *(Zea mays)* makes it appearance in the Late Archaic, but the only *macrobotanical* occurrence is in a post-A.D. 1300, Late Formative context (i.e., the corn-bearing feature at Merchant). Corn is rare for this time period and the Early Formative, but is more common in the Late Formative and Post Formative. In fact, in the entire CFO region, there are no occurrences of pre-Formative, charred corn remains, only one occurrence in the Early Formative period (at a site in the Guadalupe Mountains [Kemrer 1998]), and only a smattering from Late Formative sites scattered across the region. Most of the seed- and fruit-bearing plants are rare to common throughout all the time periods, and more taxa are present in the Formative onward. Of interest is the extreme paucity of taxa from the Archaic time frame, from all botanical data types. This should be followed up with further research into this observation.

In the general literature on plant use for the area, Leslie (1979:179) argues for shinnery oak as a staple food source, and mesquite pods serving as a secondary source. This seems to be an unsupported hypothesis, with little to no evidence from recent work in paleoethnobotany in the region, as will be presented in the next section. The predominant charred plant species in archaeological sites in far SENM is mesquite. Mesquite wood, and to a lesser extent the seeds and pods, which can be used as a carbohydrate-rich food, is the most predominant. In addition to wild foods, a select number of Mesoamerican and other domesticated species have been identified, primarily using microbotanical techniques (pollen, phytoliths, starch, and organic residues), although these are not always matched by macrobotanical remains from the same sites.

The presence of many wild species in both macro and microbotanical analyses from southeast New Mexico is expected. We find fruits, seeds, bulb and tuber use, and woody species as part of the plant use patterns for ancient and modern people of SENM. If we use modern ethnographic information as a model, the CFO would be an important foraging and traveling center between occupation areas to the west and hunting grounds to the east.

While agriculture was certainly an important practice in the American Southwest, in southeast New Mexico we have not found evidence of extensive farming outside a few localities. Many analytical and field techniques have been applied to identify agriculture (Huckell and Toll 2004). We would certainly not expect mobile hunter-gatherer groups to be engaging in agriculture,

Identification Category	Early Archaic	Middle Archaic	Late Archaic	Early Formative	Late Formative	Post Formative	All Time Periods
Gymnosperm (Naked Seed)							
Juniperus (Juniper)				R	C	VC	C
Monocot (One Cotyledon)							
Commelina erecta (Dayflower)	U	U	U	U	U	U	U
Muhlenbergia cf. (Muhly)			C	C	C	C	C
Phalaris cf. (Maygrass)	R		C	C	C	C	C
Phragmites (Reed)				R			R
Setaria cf. (Bristlegrass)				R			R
Sporobolus (Dropseed)				R	R		R
Yucca (Yucca)	R		VC	VC	VC		VC
Zea mays (Corn)			R	R	R	R	R
Dicot (Two Cotyledon)							
Acacia constricta (Acacia)					R		R
Acalypha (Shrubby Copperleaf)				R			R
Artemisia cf. (Sagebrush)					R		R
Atriplex canescens (Fourwing Saltbush)						C	R
Chamaesyce (Sandmat)					R		R
Chenopodium (Lambsquarters)			R	C	C		C
Echinocereus (Hedgehog Cactus)				R		C	C
Helianthus (Sunflower)				R			R
Mollugo (Carpetweed)				R			R
Opuntia (Prickly Pear Cactus)				R		C	C
Portulaca (Purslane)					R		R
Prosopis glandulosa (pods)				C	C	C	C
(wood) (Honey Mesquite)			C	C	C	C	C
Quercus (Oak)			R	R			R
Rhamnus/Frangula (Buckthorn)				R			R
Rhus (Sumac)					R	C	C
Sagittaria cf. (Arrowleaf)				R	R		R

Table 9: Commonality of plant species in the archaeological record by time period.
R=Rare, C=Common, VC= Very Common, U=Ubiquitous.

but trade with other groups would be an option, making the source for any botanical finds complex to interpret. In far SENM, macroscopic corn remains have been found at only a very few sites: Peñasco Bend (Jennings 1940), a site in Stinking Draw (Kemrer 1998), Merchant (Cummings and Kováčik 2013), and a site four miles west of Loco Hills (Clifton 1995). Two of these sites are in the foothills of the Guadalupe Mountains, west of the Pecos. The evidence for corn from the site west of Loco Hills is an undated corn cupule, and at the Merchant site are four kernels and 367 cupules from one of four flotation samples collected at that site. In other sites, we find the evidence for corn coming from microbotanical analysis (24 sites so far). Even in the Late Formative—the only period for which corn is clearly present in the region—we have only a small amount of macrobotanical evidence so far. This begs the question of how to explain the evidence for microbotanical corn food remains in the absence of associated, carbonized remains. This question will remain unanswered for some time. Gourd/Squash has only been identified from the Boot Hill site using FTIR (Fourier Transformation Infrared Spectrometry) is an indirect analytical technique for identifying chemical compounds in a sample; Brown [2011]). This identification is of particular interest, since squash and gourd rinds are very distinctive and can be identified in macrobotanical samples readily if present.

Model of Plant Use Combining Archaeological and Ethnographic Information

If we merge what we have found in the archaeological record and the ethnographic record we can now create a model of plant use based on broad use categories recorded by ethnographers from the various Apache groups (but not limited to those groups). There are four main variables that must be taken into consideration if we are to understand plant use both today and in the past. These variables are the plant species' biology and structure, a plants' phenology (life cycle), recorded ethnographic uses, and ecoregions where it can be found. While each variable is interesting by itself, combining and presenting all of these variables together creates a fuller picture of plant use. For instance, if we focus on Apache plume, we see that the wood is used for making cradle boards, it is available in the spring, summer, fall and winter, and can most commonly be found in ecoregion 7, the pinyon-juniper woodlands. While this may not be the only use for Apache plume, this is a detailed summary of the most important characteristics for interpretation. For every plant in this reference guide we have made every effort to collected information on all of these characteristics and present them in summary form and in each plant treatment.

There are 415 specific uses in our current data set, divided between 53 plant families and 160 pant species as recorded in our ethnographic sources. In the literature, we find six common themes of plant use: artifacts and material culture, cooking and food processing, dye stuffs, food, fuel, and medicine. There are many subdivisions within those major themes, each major category will be presented here with information on seasonality and ecoregion.

Artifacts/Material Culture

The category artifacts and material culture is defined as any use that produces a durable product that is not solely related to the other five categories (Table 10) . By definition, this category is a hodge-podge of uses but as can be seen in the summary table there are many plants that fall under this category. There are 39 species that have ethnographically documented uses specifically for artifacts and material culture, while many more were obviously used, but not recorded in the ethnographies. We can therefore infer from this data set that similar activities could have taken place in the archaeological record, when species and plant parts are found at archaeological sites.

Figure 64. The four main variables used in this reference. Combinations of these variables are used to study human, plant, and landscape interactions.

Cooking/Food Processing

Cooking and food processing are important parts of human food culture, and most plants found in SENM need to be processed in some manner. Table 11. shows only a few plant species (Alkali Sacaton, Beargrass, Prairie Sunflower, Soaptree Yucca, and Spike Muhly) were specifically mentioned in the ethnographic record as being relevant in food cooking or processing.

Dye Stuffs

Dying of woven materials and hides was an important part of material culture in the past and up to the present. There are twelve species of plants used to make black, brown, green, red, red-brown and yellow dyes (Table 12). Most of this work could have been conducted throughout the year, but fresh dye stuffs would only be available in the season listed.

Drugs/Medicine

Drugs and medicine use is a broad category and contains a large number of plants from across the CFO region. The ethnographic record is rich with information about medicinal use of plants in the Southwest. Our data will focus on historic ethnographic sources, given in Table 13. Very few of these species have been found in the archaeological record.

Plant Species; Plant Part; Season; Ecoregion	Arrow Shafts	Artifacts	Baskets	Brushes and Brooms	Cermony	Cradle Board, Baskets	Ear Piercing	Firestarter	Garlands	Insulation	Many	Mats	Mattress	Padding	Rugs	Sewing	Shelter	Soap	Strings	Switch for Disciplining	ties and rope	Weapon
Apache Plume; Fiber; (Sp) (Su)(F)(W); 7														1								
Apache Plume; Wood; (Sp) (Su)(F)(W); 7						1																
Banana Yucca; Root/Tuber; (Sp) (Su)(F)(W); 4 7																		1				
Banana Yucca; Root/Tuber; (Sp) (Su); 4 7																		1				
Banana Yucca; Stalk; (Sp) (Su)(F)(W); 4 7		1																				
Banana Yucca; Thorn; (Sp) (Su)(F)(W); 4 7																1						
Beargrass; Leaves; (Sp) (Su)(F)(W); 4			1																			
Black Cherry; Stem; (Sp) (Su)(F)(W); 7	1																					
Blue Grama; Stem; (Sp) (Su)(F)(W); 1 4 7				1																		
Broadleaf Cattail; Leaves; (Sp) (Su)(F)(W); 8															1							
Common Reed; Stem; (Sp) (Su); 8		2			1																	
Desert Willow; Wood; (Sp) (Su)(F)(W); 8											1											
Fourwing Saltbush; Root/Tuber; (Sp) (Su)(F)(W); 1 4 7 8 9																		1				
Gambel Oak; Leaves; (Su)(F)(W); 7													1									
Gambel Oak; Wood; (Sp) (Su)(F)(W); 7											1											
Hackberry; Wood; (Sp) (Su)(F)(W); 7 8 9		2																				
Honey Mesquite; Root/Tuber; (Sp) (Su)(F)(W); 4 5 6 8 9						1																
Juniper; Branches; (Sp) (Su)(F)(W); 7		1																				
Juniper; Wood; (Sp) (Su)(F)(W); 7		2																				
Little Bluestem; Fiber; (Sp) (Su)(F)(W); 1 3 7										1												
Littleleaf Sumac; Stem; (Su); 8			1																			
Louisiana Ram's Horn; Fruit/Pods; (Su)(F)(W); 2 3 6			1																			
Nipple Beehive Cactus; Thorn; (Sp) (Su)(F)(W); 6																						1
Oak; Branches; (Sp) (Su)(F)(W); 7		2																				
Oak; Leaves; (Sp) (Su)(F); 7		2																				
Oak; Wood; (Sp) (Su)(F)(W); 7		2																				
Ocotillo; Branches; (Sp) (Su)(F)(W); 6																	1					
Ocotillo; stem; (Sp) (Su)(F)(W); 6											1											
Ocotillo; Thorn; (Sp) (Su)(F)(W); 6							1															
Osage Orange; Wood; (Sp) (Su)(F)(W); 9											1											
Parry's Agave; Leaves; (Sp) (Su); 4																		1			1	
Parry's Agave; Thorn; (Sp) (Su)(F)(W); 4																1						
Plains Yucca; Root/Tuber; (Sp) (Su); 2 5																		2				
Ponderosa Pine; Wood; (Sp) (Su)(F)(W); 7											1											
Rio Grande Cottonwood; Wood; (Sp) (Su)(F)(W); 8											1											
Sacahuista; Fiber; (Sp) (Su)(F)(W); 4											1											
Sacahuista; Leaves; (Sp) ; 4												1										
Sideoats Grama; Stem; (Su)(F); 1 4 7				1																		
Skunkbush Sumac; Bark; (Sp) (Su)(F)(W); 7			1																			
Skunkbush Sumac; Stem; (Sp) (Su)(F)(W); 7			1																			
Slimflower Scurfpea; Stem; (Sp) (Su)(F)(W); 2 3									1													
Soaptree Yucca; Leaves; (Sp) (Su)(F); 4																					1	
Soaptree Yucca; Root/Tuber; (Sp) (Su)(F); 4																		1				
Sotol; Leaves; (Sp) (Su); 4																					1	
Sotol; Stem; (Sp) (Su); 4								1			1											
Southwestern White Pine; Wood; (Sp) (Su)(F)(W);											1											
Spider Milkweed; Fiber; (Sp) (Su)(F)(W); 5 6																			1			
Sumac; Wood; (Sp) (Su)(F)(W); 2 7 8		1																				
Sunflower; stalk; (F)(W); 8 9		1																				
Texas Mulberry; Wood; (Sp) (Su); 8 9		1																				
Torrey's Yucca; Root/Tuber; (Su)(F)(W); 4 6																		1				

Table 10. Number of instances in the ethnographic record each species is mentioned to make artifacts and material culture. ***Continued on next page….***

Plant Species; Plant Part; Season; Ecoregion	Arrow Shafts	Artifacts	Baskets	Brushes and Brooms	Cermony	Cradle Board, Baskets	Ear Piercing	Firestarter	Garlands	Insulation	Many	Mats	Mattress	Padding	Rugs	Sewing	Shelter	Soap	Strings	Switch for Disciplining	ties and rope	Weapon
Twoneedle Pinyon; Branches; (Sp) (Su)(F)(W); 7		1																				
Twoneedle Pinyon; Leaves; (Sp) (Su)(F)(W); 7		1																				
Twoneedle Pinyon; Pollen; (Sp) ; 7					1																	
Twoneedle Pinyon; Wood; (Sp) (Su)(F)(W); 7		1																				
Western Soapberry; Root/Tuber; (Sp) (Su)(F)(W); 2 3 8 9																		1				
Western Soapberry; Wood; (Sp) (Su)(F)(W); 2 3 8 9											1											
Willow; Bark; (Sp) (Su)(F)(W); 8			1																			
Willow; Stem; (Sp) (F)(W); 8	1		1																	1		

Table 10: ***Continued from previous page.***

Plant Species; Plant Part; Season; Ecoregion	Drying Mescal Agave	Preserving Fruit	Roasting Mescal	Steam Cooking
Alkali Sacaton; Leaves; (Sp) (Su)(F)(W); 8				1
Beargrass; Leaves; (Sp) (Su)(F)(W); 4		1	1	
Prairie Sunflower; Leaves; (F); 1 2 3	1			
Soaptree Yucca; Leaves; (Sp) (Su)(F); 4	1			
Spike Muhly; Leaves; (Sp) (Su)(F)(W); 4 7				1

Table 11. Plants used in food processing and cooking

Plant Species; Plant Part; Season; Ecoregion	Black	Brown	Green	Red	Red-Brown	Yellow
Annual Buckwheat; Leaves; (Sp) (Su)(F)(W); 2 3		1				
Arizona Walnut; Bark; (F); 8		1				
Arizona Walnut; Fruit/Pods; (F); 8		1				
Black Cherry; Fruit/Pods; (Su)(F); 7			1			
Broom Snakeweed; Flower; (Su)(F); 1 2 4 5 6 7 8 9						1
Hopi Tea Greenthread; Flower; (Sp) (Su)(F); 6 8 9					1	
Indian Paintbrush; Root/Tuber; (Sp) (Su)(F)(W);	1					
Littleleaf Ratany; Root/Tuber; (Sp) (Su)(F)(W); 4 5 6				1		
Louisiana Ram's Horn; Fruit/Pods; (Su)(F)(W); 2 3 6	1					
Osage Orange; Root/Tuber; (Sp) (Su)(F)(W); 9						1
Plains Yucca; Leaves; (Sp) (Su); 2 5			1			
Red Barberry; Fruit/Pods; (Su)(F); 4 6 7						1
Red Barberry; Root/Tuber; (Sp) (Su)(F)(W); 4 6 7						1
Rocky Mountain Zinnia; Flower; (Sp) (Su)(F); 1 4 5 6 9						1
Woolly Paperflower; Flower; (Sp) (Su)(F); 1 4 5 6 7 9						1

Table 12. Plants used to make dyes and paints.

The left column of Tables 10-14 gives the plant species, the plant part used, the season abbreviation, and the numeric code for each ecoregion (see Figure 2 for ecoregions numbers)

Taxa	Plant Part	Use	Season	Ecoregion
Apache Plume	Leaves	Unspecified	(Sp) (Su)(F)	7
Balloonbush	Leaves	antiinflammitory	(Su)(F)	2 5 6
Banana Yucca	Leaves	Unspecified	(Sp) (Su)	4 7
Beardtongue	Leaves	emetic	(Sp) (Su)(F)	2 3
Beargrass	Leaves	Insect-repellant	(Sp) (Su)(F)(W)	
Big Bluestem	Root/Tuber	many	(Sp) (Su)(F)(W)	1 2 3
Black Cherry	Bark	Antidiarrheal	(Sp) (Su)(F)(W)	
Black Cherry	Bark	Burn Dressing	(Sp) (Su)(F)(W)	
Blazingstar	Leaves	Diuretic	(F)(W)	1 4 5 6 9
Blue Grama	Stem	Many	(Su)(F)	1 4 7
Broadleaf Cattail	Pollen	Many	(Sp) (Su)	8
Broom Snakeweed	Stem	Unspecified	(Su)(F)(W)	1 2 4 5 6 7 8 9
Canadian Mint	Leaves	many	(Sp) (Su)(F)	8
Chinese Lantern	Root/Tuber	Grippe	(Su)(F)(W)	9
Chinese Thorn-apple	Root/Tuber	many	(Sp) (Su)(F)(W)	2 3 8
Chokecherry	Fruit/Pods	Medicine	(Su)	7 8
Christmas Cactus	Fruit/Pods	narcotic	(Su)(F)(W)	4 7
Cocklebur	Leaves	blood medicine	(Sp) (Su)(F)	8
Cocklebur	Root/Tuber	blood medicine	(Sp) (Su)(F)(W)	8
Common Reed	Root/Tuber	diarrhea	(Sp) (Su)	8
Common Reed	Stem	Drug	(Sp) (Su)	8
Creosote Bush	Leaves	many	(Sp) (Su)(F)	6
Croton	Leaves	kidney infections	(Sp) (Su)(F)	2 6
Crownbeard	Leaves	fever	(Sp) (Su)(F)	4 8 9
Cryptantha	Leaves	snakebite	(Sp) (Su)(F)	4 5
Desert Holly	Leaves	tea for broken bones	(Sp) (Su)(F)(W)	4 5 6
Desert Tobacco	Leaves	smoked	(Sp) (Su)(F)	6 8
Dotted Gayfeather	Root/Tuber	urinary aid	(Sp) (Su)(F)(W)	1
Drummond's Skullcap	Root/Tuber	many	(Sp) (Su)(F)(W)	4
False Pennyroyal	Leaves	tea	(Sp) (Su)(F)	4 7
Featherplume	Leaves	Many	(Sp) (Su)(F)	1 6
Fendler's Bladderpod	Leaves	stings	(Sp) (Su)	5 6
Fetid Marigold	Leaves	stings	(Sp) (Su)(F)	2 5 6 7 8 9
Fourwing Saltbush	Leaves	many	(Sp) (Su)(F)(W)	1 4 7 8 9
Fourwing Saltbush	Root/Tuber	many	(Sp) (Su)(F)(W)	1 4 7 8 9
Gambel Oak	Seeds	Potency aid	(Su)(F)(W)	7
Giant Dropseed	Stem	prayer sticks	(Sp) (Su)(F)(W)	3
Gray's Feverfew	Leaves	burns	(Sp) (Su)(F)	4 6 8
Hedgehog Pricklypoppy	Seeds	many	(Su)(F)	5 9
Herb Sophia	Leaves	toothache	(Sp) (W)	5 9
Hoary Rosemarymint	Leaves	many	(Sp) (Su)(F)	6
Honey Mesquite	Fruit/Pods	earache	(Sp) (Su)(F)(W)	4 5 6 8 9
Honey Mesquite	Fruit/Pods	Medicine	(Sp) (Su)(F)(W)	4 5 6 8 9
Honey Mesquite	Leaves	antifungal	(Sp) (Su)(F)(W)	4 5 6 8 9
Honey Mesquite	Leaves	Medicine	(Sp) (Su)(F)(W)	4 5 6 8 9
Hopi Tea Greenthread	Flower	tea	(Sp) (Su)(F)	6 8 9
Hopi Tea Greenthread	Stem	tea	(Su)(F)(W)	6 8 9
Horehound	Leaves	many	(Sp) (Su)(F)	5 9
Indian Paintbrush	Leaves	many	(Sp) (Su)(F)	

Table 13. Plants listed as having medicinal value, by use, season, and ecoregion

Taxa	Plant Part	Use	Season	Ecoregion
Juniper	Branches	Medicine	(Sp) (Su)(F)(W)	
Juniper	Leaves	Drug	(Sp) (Su)(F)(W)	
Juniper	Leaves	Medicine	(Sp) (Su)(F)(W)	
Knotweed	Leaves	unspecified	(Sp) (Su)(F)	8
Lambsquarters	Leaves	many	(Sp) (Su)	4 7 8 9
Little Bluestem	Stem	sores	(Sp) (Su)(F)(W)	1 3 7
Littlehead Tarweed	Flower	many	(Sp) (Su)	8
Littleleaf Ratany	Root/Tuber	wound care	(Sp) (Su)(F)(W)	4 5 6
Littleleaf Sumac	Flower	not specified	(Sp)	8
Littleleaf Sumac	Wood	not specified	(Sp) (Su)(F)(W)	8
Louisiana Ram's Horn	Fruit/Pods	Medicine	(Su)(F)(W)	2 3 6
Louisiana Ram's Horn	Fruit/Pods	wart removal	(Su)(F)	2 3 6
Louisiana Sagewort	Leaves	many	(Sp) (Su)(F)(W)	7
Louisiana Sagewort	Leaves	smudge	(Sp) (Su)(F)(W)	7
Mesa Pepperwort	Leaves	Unspecified	(Sp)	5 6 7 9
Mescal Bean	Seeds	earache	(Su)(F)	4
Milkvetch	Leaves	emetic	(Sp) (Su)(F)	2 4 5 6 7
Missouri Gourd	Fruit/Pods	Drug	(Su)(F)	1 4 5 7 9
Missouri Gourd	Seeds	Drug	(F)(W)	1 4 5 7 9
New Mexico thistle	Leaves	many	(Sp) (Su)	4 6 7
Nightshade	Leaves	unspecified	(Sp) (Su)(F)	5 6 9
Oak	Leaves	Medicine	(Sp) (Su)(F)	
Ocotillo	Flower	Many	(Sp) (Su)	6
Ocotillo	Leaves	many	(Sp) (Su)(F)(W)	6
Oneseed Juniper	Fruit/Pods	Diuretic	(Su)(F)(W)	7
Oneseed Juniper	Leaves	digestion	(Sp) (Su)(F)(W)	7
Oneseed Juniper	Root/Tuber	energy drink for infants	(Su)(F)(W)	7
Oneseed Juniper	Wood	ceremonial fires	(Sp) (Su)(F)(W)	7
Osage Orange	Root/Tuber	eye wash	(Sp) (Su)(F)(W)	9
Parry's Agave	Leaves	burns	(Sp) (Su)	4
Plantain	Leaves	many	(Sp) (Su)	2 5 6
Prairie Sagewort	Leaves	smoking with tobacco	(Sp) (Su)(F)(W)	
Prairie Sagewort	Leaves	smudge	(Sp) (Su)(F)(W)	
Prickly Pear Cactus	Leaves	Drug	(Sp) (Su)(F)	
Prickly Pear Cactus	Stem	wound care	(Su)(F)	4 5 6
Prickly Russian Thistle	Leaves	stings	(Sp) (Su)(F)	1 4 5 6 7 8 9
Pricklyleaf Dogweed	Leaves	smoking with tobacco	(Sp) (Su)(F)	5 6 9
Prostrate Pigweed	Leaves	smoked	(Sp) (Su)(F)	4 8 9
Puncturevine	Leaves	unspecified	(Sp) (Su)(F)	6 9
Red Barberry	Fruit/Pods	Drug	(Su)(F)	4 6 7
Red Barberry	Fruit/Pods	many	(Su)(F)	4 6 7
Red Barberry	Root/Tuber	Medicine	(Sp) (Su)(F)(W)	4 6 7
Redroot Amaranth	Leaves	many	(F)(W)	4 8 9
Rio Grande Cottonwood	Bark	wound care	(Sp) (Su)(F)(W)	8
Rio Grande Cottonwood	Leaves	Drug	(Sp) (Su)(F)	8
Rio Grande Cottonwood	Leaves	wound care	(Sp) (Su)(F)	8
Rocky Mountain Zinnia	Leaves	Many	(Sp) (Su)(F)	1 4 5 6 9
Sacahuista	Root/Tuber	rheumatism	(Sp)	4
Sand Sagebrush	Leaves	many	(Sp) (Su)(F)(W)	2 3
Sandmat	Stem	many	(Su)(F)(W)	2 3 5

Table 13. ***Continued from page 64.***

Taxa	Plant Part	Use	Season	Ecoregion
Scarlet Hedgehog Cactus	Stem	heart stimulant	(Su)(F)	4 6
Scouring Rush	Stem	many	(Sp) (Su)(F)(W)	8
Shepherd's Purse	Leaves	many	(Sp)	5 8 9
Slimflower Scurfpea	Leaves	consumption aid	(Sp) (Su)(F)	2 3
Snowball Sand Verbena	Flower	many	(Sp) (Su)	3
Snowball Sand Verbena	Leaves	many	(Sp) (Su)(F)	3
Snowball Sand Verbena	Root/Tuber	many	(Su)(F)(W)	3
Sorghum	stem	Drug	(Sp) (Su)(F)	
Southwestern White Pine	Leaves	Drug	(Sp) (Su)(F)(W)	
Spinystar	Fruit/Pods	diarrhea	(F)	4 7
Spotted Beebalm	Leaves	cough	(Sp) (Su)(F)	2 3 5 6
Sumac	Fruit/Pods	Medicine	(Su)	
Sunflower	Sap	Medicine	(Su)(F)	
Sunflower	stalk	Medicine	(F)(W)	
Threadleaf Ragwort	Leaves	many	(Sp) (Su)(F)(W)	2 4 6
Torrey's Jointfir	Stem	many	(Sp) (Su)	4 6
Touristplant, Spectacle Pod	Leaves	many	(Sp) (Su)(F)	2 3 5 6 9
Tree Cholla	Flower	Diuretic	(Sp)	1 4 7
Tree Cholla	Root/Tuber	Hair tonic	(Sp)	1 4 7
Twinleaf Senna	Leaves	many	(Sp) (Su)(F)	4 5 6
Twoneedle Pinyon	Leaves	Medicine	(Sp) (Su)(F)(W)	7
Western Soapberry	Sap	wound care	(Su)(F)(W)	2 3 8 9
Whitemouth Dayflower	Leaves	consumption aid	(Sp) (Su)(F)	2 3
Whitest Eveningprimrose	Leaves	many	(Sp) (W)	5 6 9
Wild Rose	Fruit/Pods	unspecified	(F)(W)	
Winterfat	Leaves	many	(Sp) (Su)(F)	1 5
Woolly Paperflower	Flower	many	(Sp) (Su)(F)	1 4 5 6 7 9
Woolly Paperflower	Leaves	many	(Sp) (Su)(F)	1 4 5 6 7 9
Yellowspine Thistle	Flower	wound care	(Su)(F)	4 6 7

Table 13. ***Continued from page 65.***

Fuel Species by Season and Ecoregion
Alligator Juniper; Wood; (Sp) (Su)(F)(W); 7
Catclaw Acacia; Wood; (Sp) (Su)(F)(W); 6
Featherplume; Wood; (Sp) (Su)(F)(W); 1 6
Honey Mesquite; Wood; (Sp) (Su)(F)(W); 4 5 6 8 9
Juniper; Wood; (Sp) (Su)(F)(W); 7
Oak; Wood; (Sp) (Su)(F)(W); 7
Ocotillo; stem; (Sp) (Su)(F)(W); 6
Ocotillo; Wood; (Sp) (Su)(F)(W); 6
Pinchot's Juniper; Wood; (Sp) (Su)(F)(W); 4 7
Southwestern White Pine; Wood; (Sp) (Su)(F)(W);
Torrey's Jointfir; Wood; (Sp) (Su)(F)(W); 4 6
Twoneedle Pinyon; Wood; (Sp) (Su)(F)(W); 7
Whitethorn Acacia; Wood; (Sp) (Su)(F)(W); 6
Woods' Rose; Wood; (F)(W); 7 8 9

Table 14. Plants listed as useful as fuel from the Lipan, Mescalero, and Plains Mescalero.

Common Name; Plant Part; Season; Ecoregion	Beverage	Bread & Cake	Candy	Food	Gum	Nectar	Seasoning
Alligator Juniper; Fruit/Pods; (F)(W); 7				1			
Alligator Juniper; Fruit/Pods; (Sp) (Su)(F)(W); 7				2			
Arctic Rush; Root/Tuber; (Sp) (F)(W); 8				1			
Arizona Walnut; Nuts; (F); 8				1			
Arizona Walnut; Seeds; (F); 8				1			
Balloonbush; Fruit/Pods; (Su)(F); 2 5 6				1			
Banana Yucca; Flower; (Sp) (Su); 4 7				1			
Banana Yucca; Fruit/Pods; (F)(W); 4 7		1		2			
Banana Yucca; Root/Tuber; (F)(W); 4 7				1			
Black Cherry; Fruit/Pods; (Su)(F);				1			
Blazingstar; Seeds; (F)(W); 1 4 5 6 9				1			
Blue Grama; Seeds; (Su)(F); 1 4 7				1			
Broadleaf Cattail; Fruit/Pods; (Sp) (Su); 8				1			
Broadleaf Cattail; Leaves; (Sp) (Su); 8				1			
Broadleaf Cattail; Root/Tuber; (Sp) ; 8				1			
Broadleaf Cattail; Seeds; (Su)(F)(W); 8				1			
Canaigre Dock; Leaves; (Sp) (W); 3 5				1			
Canyon Grape; Fruit/Pods; (Su)(F); 7 8				1			
Carruth's Sagewort; Seeds; (F); 4 7				1			
Catclaw Acacia; Seeds; (Sp) (F)(W); 6				1			
Chinese Lantern; Fruit/Pods; (Su)(F); 9				1			
Chokecherry; Fruit/Pods; (Su); 7 8				1			
Christmas Cactus; Fruit/Pods; (Su)(F)(W); 4 7				1			
Common Reed; Leaves; (Sp) (Su); 8				1			
Common Sunflower; Seeds; (F); 8 9		1					
Corn; Seeds; (Su)(F); 9				2			
False Pennyroyal; Leaves; (Sp) (Su)(F); 4 7	1						1
Five Eyes; Seeds; (Su)(F); 5 6 9				1			
Fourwing Saltbush; Leaves; (Sp) (Su)(F)(W); 1 4 7 8 9				1			
Fourwing Saltbush; Seeds; (F)(W); 1 4 7 8 9				1			
Fringed Twinevine; Sap; (Sp) (Su)(F); 5 6 8				1			
Gambel Oak; Seeds; (Su)(F)(W); 7				1			
Geyer's Onion; Leaves; (Sp) (Su); 2 5				1			
Geyer's Onion; Root/Tuber; (Sp) (Su); 2 5				1			
Giant Dropseed; Seeds; (F); 3				1			
Globemallow; Fruit/Pods; (Su)(F); 1 4 5 6 7 9				1			
Globemallow; Leaves; (Sp) (Su)(F); 1 4 5 6 7 9				1			
Globemallow; Root/Tuber; (Sp) (F)(W); 1 4 5 6 7 9				1			
Goosefoot; Leaves; (Sp) (Su)(W); 4 7 8 9				1			
Goosefoot; Seeds; (Sp) (Su)(F)(W); 4 7 8 9				1			
Graham's Nipple Cactus; Fruit/Pods; (Su); 4				1			
Green Sotol; Heart/Crown; (Sp) (Su); 4				1			
Groundcherry; Fruit/Pods; (Su); 5 6				1			
Hackberry; Fruit/Pods; (Su)(F); 7 8 9				1			
Havard Oak; Seeds; (Su)(F); 2 3				1			
Heliotrope; Seeds; (Su)(F)(W); 3				1			
Herb Sophia; Leaves; (Sp) (W); 5 9				1			
Honey Mesquite; Fruit/Pods; (Sp) (Su)(F)(W); 4 5 6 8 9				5			
Honey Mesquite; Seeds; (Sp) (Su)(F)(W); 4 5 6 8 9		1					
Indian Paintbrush; Flower; (Sp) (Su)(F); 7						1	
Indian Paintbrush; Leaves; (Sp) (Su)(F); 7				1			
Indian Rushpea; Root/Tuber; (Sp) (F)(W); 1 4 5 6 9				1			
Javelina Bush; Fruit/Pods; (Su)(F); 6				1			
Juniper; Leaves; (Sp) (Su)(F)(W); 7				1			

Table 15. Plants used as food from the recorded ethnographic record.

Common Name; Plant Part; Season; Ecoregion	Beverage	Bread & Cake	Candy	Food	Gum	Nectar	Seasoning
Lambsquarters; Leaves; (Sp) (Su)(W); 4 7 8 9				1			
Lambsquarters; Root/Tuber; (Sp) (Su); 4 7 8 9				1			
Lambsquarters; Seeds; (Sp) (Su); 4 7 8 9				1			
Little Hogweed; Leaves; (Sp) (Su)(F); 5 9				1			
Littleleaf Sumac; Fruit/Pods; (Su); 8				1			
Littleleaf Sumac; Seeds; (Su); 8				1			
Lotebush; Fruit/Pods; (Su)(F)(W); 4 6				1			
Louisiana Ram's Horn; Fruit/Pods; (Su)(F); 2 3 6				1			
Louisiana Ram's Horn; Seeds; (Su)(F)(W); 2 3 6				1			
Louisiana Sagewort; Leaves; (Sp) (Su)(F)(W); 7	1						
Louisiana Sagewort; Stem; (Su)(F)(W); 7	1						
Louisiana Vetch; Seeds; (F); 4 7				1			
Mesa Pepperwort; Leaves; (Sp) ; 5 6 7 9				1			
Missouri Gourd; Root/Tuber; (Sp) (F)(W); 1 4 5 7 9				1			
Missouri Gourd; Seeds; (F)(W); 1 4 5 7 9				2			
Needlegrass; Seeds; (F)(W); 1 4				1			
Neglected Sunflower; Seeds; (F); 2 3				1			
Netleaf Hackberry; Fruit/Pods; (Sp) (Su); 3 8 9				1			
New Mexico thistle; Leaves; (Sp) (Su); 4 6 7				1			
Mesa Pepperwort; Leaves; (Sp) ; 5 6 7 9				1			
Missouri Gourd; Root/Tuber; (Sp) (F)(W); 1 4 5 7 9				1			
Missouri Gourd; Seeds; (F)(W); 1 4 5 7 9				2			
Needlegrass; Seeds; (F)(W); 1 4				1			
Neglected Sunflower; Seeds; (F); 2 3				1			
Netleaf Hackberry; Fruit/Pods; (Sp) (Su); 3 8 9				1			
New Mexico thistle; Leaves; (Sp) (Su); 4 6 7				1			
Oak; Bark; (Sp) (Su)(F)(W); 7				1			
Oak; Nuts; (Su)(F)(W); 7				1			
Obtuse Panicgrass; Seeds; (F)(W); 8				1			
Oneseed Juniper; Fruit/Pods; (Su)(F)(W); 7				2			
Oneseed Juniper; Root/Tuber; (Su)(F)(W); 7				1			
Onion; Root/Tuber; ; 5				1			
Pale Wolfberry; Fruit/Pods; (Su); 4 6 7 8				1			
Parry's Agave; Heart/Crown; (Sp) (Su); 4				1			
Pinchot's Juniper; Fruit/Pods; (F)(W); 4 7				1			
Pinchot's Juniper; Fruit/Pods; (Sp) (Su)(F)(W); 4 7				2			
Pinkflower Hedgehog Cactus; Fruit/Pods; (Su)(F); 4				2			
Pitseed Goosefoot; Leaves; (Sp) (Su)(W); 4 7 8 9				1			
Pitseed Goosefoot; Root/Tuber; (Sp) (Su); 4 7 8 9				1			
Plains Yucca; Flower; (Sp) (Su); 2 5				1			
Plains Yucca; Leaves; (Sp) (Su); 2 5				1			
Plains Yucca; stalk; (Sp) (Su); 2 5				1			
Plantain; Leaves; (Sp) (Su); 2 5 6				1			
Plantain; Seeds; (Su); 2 5 6				1			
Ponderosa Pine; Sap; (F); 7		1					
Ponderosa Pine; Seeds; (F); 7				1			
Prairie Sunflower; Seeds; (F); 1 2 3				1			
Prickly Pear Cactus; Fruit/Pods; (Su)(F); 4 5 6				1			
Prickly Russian Thistle; Seeds; (Su)(F); 1 4 5 6 7 8 9				1			
Prostrate Pigweed; Leaves; (Su); 4 8 9				1			
Prostrate Pigweed; Root/Tuber; (Su)(F); 4 8 9				1			
Prostrate Pigweed; Seeds; (Su)(F); 4 8 9		1					
Purple Prairie Clover; Root/Tuber; (Sp) (F)(W); 1				1			
Red Barberry; Fruit/Pods; (Su)(F); 4 6 7				2			
Redroot Amaranth; Leaves; (F)(W); 4 8 9				1			
Redroot Amaranth; Seeds; (F)(W); 4 8 9		1					

Table 15. ***Continued from page 58.***

Common Name; Plant Part; Season; Ecoregion	Beverage	Bread & Cake	Candy	Food	Gum	Nectar	Seasoning
Rio Grande Cottonwood; Bark; (Sp) (Su)(F)(W); 8							
Rio Grande Cottonwood; Bud; (Sp) (Su)(F); 8			1				
Rock Weed; Leaves; (Sp) (Su)(F)(W); 4 7	1						
Sacahuista; Leaves; (Sp) ; 4				1			
Sacahuista; Root/Tuber; (Sp) ; 4				1			
Sacahuista; Stem; (Sp) ; 4				1			
Sand Dropseed; Seeds; (F); 2 4 6		1					
Scarlet Hedgehog Cactus; Fruit/Pods; (Su)(F); 4 6				1			
Shepherd's Purse; Seeds; (Sp) ; 5 8 9		1					
Siberian Elm; Leaves; (Sp) (Su); 8 9				1			
Skunkbush Sumac; Fruit/Pods; (Su)(F); 7				1			
Slimflower Scurfpea; Leaves; (Sp) (Su)(F); 2 3				1			
Snowball Sand Verbena; Root/Tuber; (Su)(F)(W); 3				1			
Soaptree Yucca; Flower; (Sp) (Su)(F); 4				1			
Soaptree Yucca; Root/Tuber; (Sp) (Su)(F); 4				1			
Sotol; Heart/Crown; (Sp) (Su); 4	1	1					
Southwestern White Pine; Sap; (F); 7				1			
Southwestern White Pine; Seeds; (F); 7				1			
Spider Milkweed; Leaves; (Sp) (Su)(F); 5 6					1		
Spider Milkweed; Sap; (Su)(F); 5 6			1				
Spider Milkweed; Stem; (Su)(F)(W); 5 6					1		
Spinystar; Fruit/Pods; (F); 4 7				1			
Sumac; Fruit/Pods; (Su); 2 7 8				3			
Sundrops; Fruit/Pods; (Su)(F); 2 3				1			
Sunflower; Seeds; (F); 8 9				1			
Texas Mulberry; Fruit/Pods; (Sp) (Su); 8 9		1		1			
Torrey's Jointfir; Seeds; (Sp) (Su); 4 6				1			
Torrey's Yucca; Seeds; (Su)(F)(W); 4 6		1					
Tree Cholla; Fruit/Pods; (Sp) ; 1 4 7				1			
Tree Cholla; Leaves; (Sp) ; 1 4 7				1			
Tree Cholla; Root/Tuber; (Sp) ; 1 4 7				1			
Twoneedle Pinyon; Nuts; (F); 7				3			
Twoneedle Pinyon; Seeds; (F); 7				1			
Watermelon; Fruit/Pods; (Su)(F); 2 9				1			
Whitemouth Dayflower; Leaves; (Sp) (Su)(F); 2 3				1			
whitemouth dayflower; Root/Tuber; (Su)(F)(W); 2 3				1			
Whitest Eveningprimrose; Fruit/Pods; (Su); 5 6 9				1			
Whitest Eveningprimrose; Leaves; (Sp) (W); 5 6 9				1			
Whitest Eveningprimrose; Seeds; (Su)(F)(W); 5 6 9				1			
Whitethorn Acacia; Seeds; (Sp) (F)(W); 6				1			
Wild Celery; Leaves; (Su)(F); 4							1
Wild Celery; Root/Tuber; (Su)(F); 4				1			
Wild Rose; Fruit/Pods; (F)(W); 7 8 9				1			
Willow; Leaves; (Sp) (F)(W); 8				1			
Woods' Rose; Fruit/Pods; (F)(W); 7 8 9				4			
Yellow Nutsedge; Root/Tuber; (Sp) (F)(W); 3 8				1			
Yellowspine Thistle; Leaves; (Sp) (Su); 4 6 7				1			

Table 15. ***Continued from page 59.***

Fuel

Fuel use is constantly needed throughout the year for cooking, heat, light, and other needs. Fuel availability was probably never a problem in SE New Mexico, given the amount of woody plants on the landscape. Table 14 shows the species of plants listed as important as fuel sources in the ethnographic record. Archaeologically mesquite is the most common, showing up as charcoal in most sites with fire features.

Foods

The food category contains any plant that is utilized primarily for human caloric consumption. This does not preclude other uses, such as for medicine or ritual. Within the broad food category there are several sub-categories: Vegetables, fruits/pods, seeds, and tuber/roots. Table 15 shows the species of plants used primarily for food, sorted by when the edible plant part is available by season. If we summarize the available food by season we see there are many food sources in all seasons, and in many ecoregions. When we add to the fact that most foods can be processed and stored as a raw or finished product, the availability of food was probably not a problem. Since populations were most likely low, plant foods could be gathered readily from the environment when needed all year round.

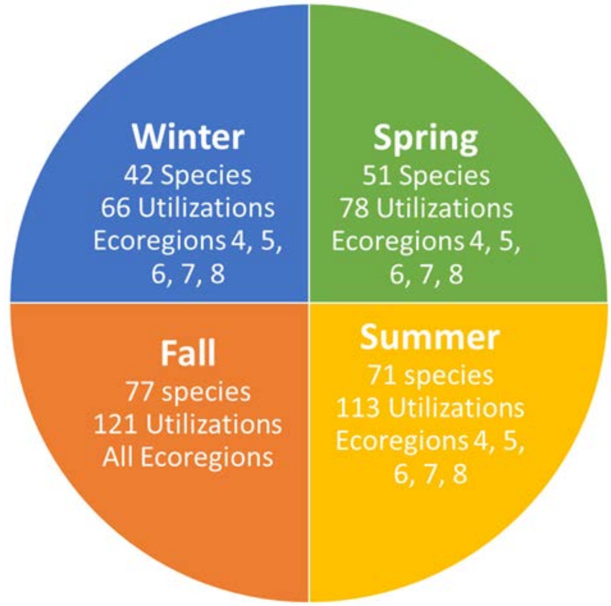


Figure 65. Food availability by season, with number of species, number of specific plant utilizations recorded, and the ecoregions that have the highest abundance of food plants.

Seasonality

The annual round of the seasons play an important role of when, where, and how much food and other plant products are available in the CFO (Figure 65). Figures 66-69 show the importance of plant foods by season, illustrated by the number of plant food species available, by ecoregion. Faint regions (white) in Figures 66-69 have relatively few food resources, while strongly shaded regions (Black) have more plant foods. By far, the most economically important region for plant foods by number of species and by season is Ecoregion 4, the Chihuahuan semi-desert grassland, with at least one-third of the number of available species by season available. The next most productive areas are Ecoregions 5, 6, 7, and 8, with an average of about 25 percent of the available species by ecoregion. The least productive areas by species are 1, 2, and 3, the plains and shrubland areas with less than 25% of the available species. Species coverage is not available at this time, but if percentage coverage was known, one could also calculate by area, the most important regions for each species, further work in this area is needed for the CFO.

Spring: Spring is the season when we find the first flush of plants in the landscape, which corresponds to the first rains and new water for the year. Appendix B: Table 1 shows important plant products by species that are available in the spring. If we merge our ethnographic information with seasonality and ecoregion we can see that ecoregion 4 has the most plant foods available, of note are the agaves that would have been processed and provide storable food for the entire year.

Summer: The summer is a hot and potentially dry time of year if the monsoonal rains fail to come to the CFO. Appendix B: Table 2 shows the plants available in the summer, by major use. There are many plants available to eat in this time of year, with pot herbs, starches, and seasonings coming available.

Fall: Fall is the natural harvest time for the CFO, with the most species of plant available of all the seasons. Appendix B: Table 3 shows the plants available in the Fall, by major use. The most important plants available would be the mesquites in the Mescalero plain, and the pines in the highlands and uplands to the west. Seeds of wild plants, and the potential for corn trading are also available at this time.

Winter: This season has the fewest species available but there are enough plants, along with storable food sources to over winter in the area. Appendix B: Table 4 has the listing of species available in the winter. The most important foods would still be available as stored items, but depending on the timing of flowering and fruit development, many plant foods would be available well into the winter.

Seasonal Rotation: Given that plant products are

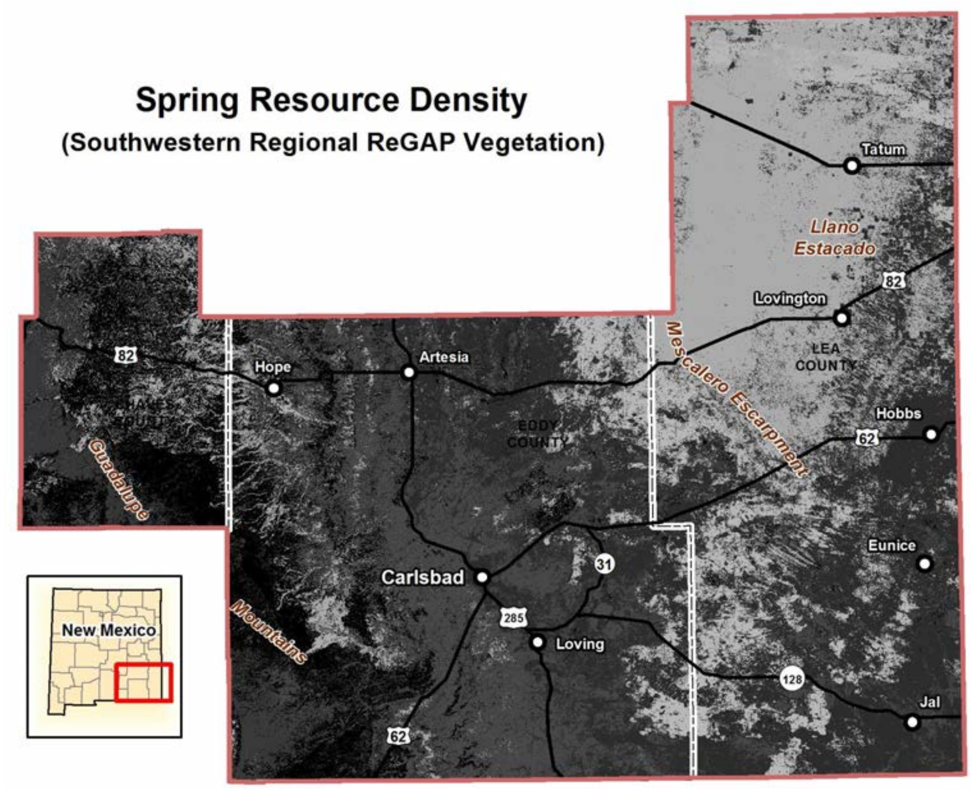


Figure 66. Relative resource availability for the CFO region in the spring. Dark areas represent relatively high resource availability while light areas are relatively resource poor.

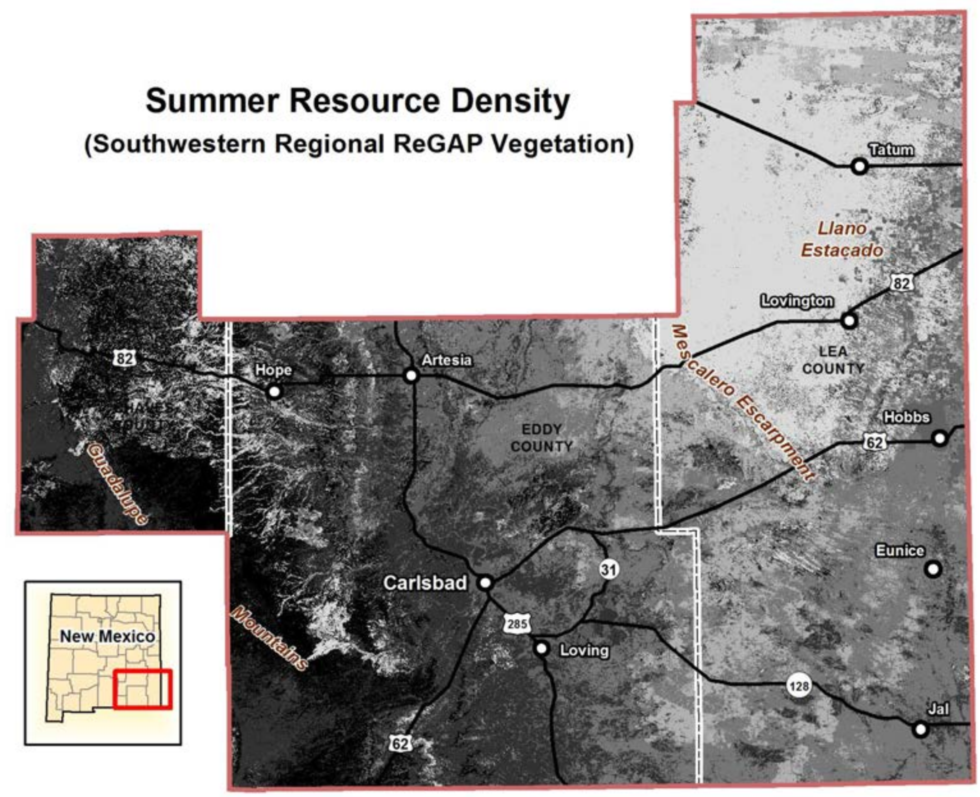


Figure 67 Relative resource availability for the CFO region in the summer. Dark areas represent relatively high resource availability while light areas are relatively resource poor.

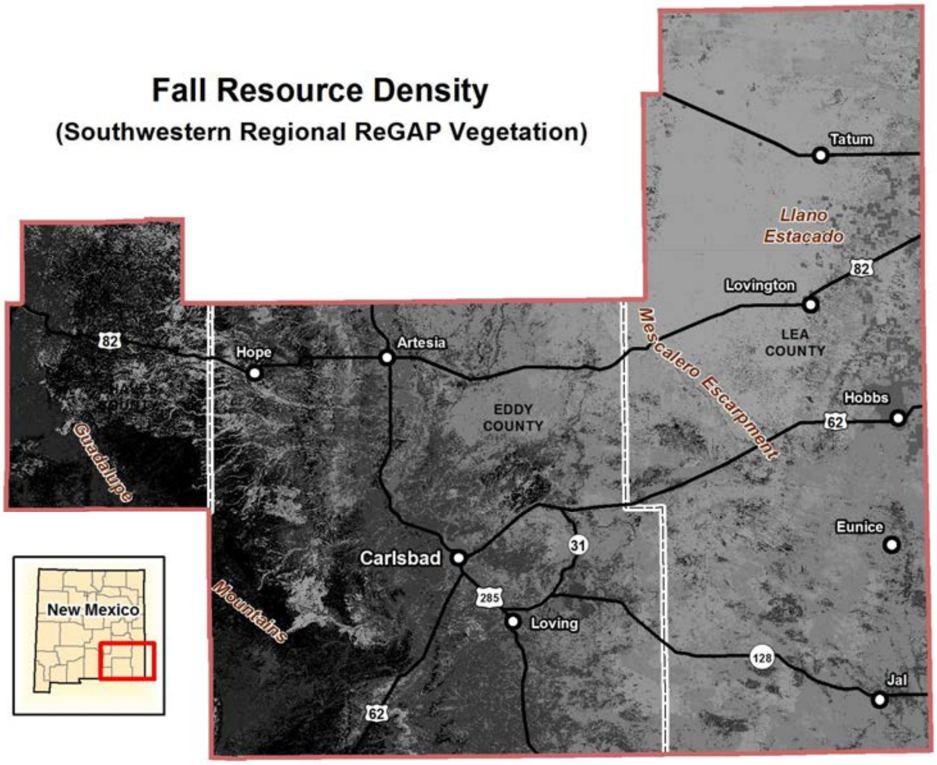


Figure 68. Relative resource availability for the CFO region in the fall. Dark areas represent relatively high resource availability while light areas are relatively resource poor.

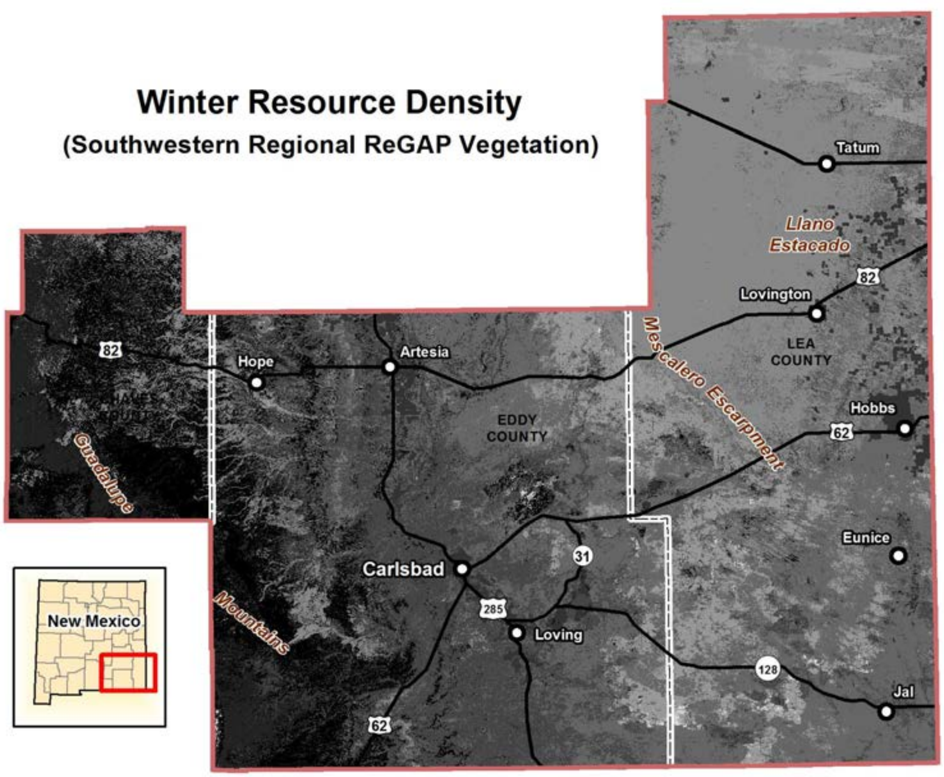


Figure 69. Relative resource availability for the CFO region in the winter. Dark areas represent relatively high resource availability while light areas are relatively resource poor.

Questions for Future Research and Exploration

Given the comparatively small amount of information we know about plant use in prehistory, when compared to today; here is a list of ten questions needing more research:

1. What was Paleoindian plant use like? Given the paucity of data available from the first peoples of New Mexico to the Archaic, we can only speculate about plant use.

2. What was Archaic plant use like? We have a few hints of Archaic plant use in SE New Mexico, but nothing like the information we have from later time periods.

3. When (or if?) does agriculture starts in Southeast New Mexico? We have the handful in instances of corn in SE New Mexico but nothing like the information we have from groups further west.

4. How much and what type of trading of plant remains occurred in the past? We gave historic evidence of plains groups trading with agricultural groups from many sources, but when this system began is not known.

5. What were the specific uses for each species in the past? We present modern plant uses from ethnographic sources, but how plants were used in the past is still speculation.

6. How have plant species distribution changed in the Holocene in SENM? Given the radical change in plant species in the modern era, we have little to no information about past plant populations.

7. What was the round of human migration in the Holocene given past environments? With a model of past plant populations, we could deduce a model of human migration, but again this is not known.

8. How have human populations changed the distribution of plants due to exploitation? We know that modern plant and animal uses have changed plant populations, but how did ancient peoples affect plant populations?

9. How far into the past can we push the analogy of ethnographic plant use? While we can make good use of modern data we should always be careful when making direct analogies between peoples separated in time. Modern plant uses mentioned in this text are suggestions and are not definitive proof of ancient plant uses.

10. Given a permanent water resource like the Pecos River, why do we not find villages in the Pecos River Valley? We see many permanent settlements in large river valleys here in New Mexico, but no large permanent settlements have been found in the CFO region along the Pecos.

Figure 70. Excavation of a shallow structure along the Pecos River. Archaeological sites like this are a prime source of information about past plant use.

available throughout the year, in many different ecoregions, we can create a hypothetical general rotation of foragers through the CFO given the density of plant foods. In the spring, hunting and gathering populations would be centered around the mescal agave harvesting localities, west of the Pecos river. We find thousands of small roasting pit sites in this area, and we know from ethnographic evidence and modern practice that mescal agave is harvested at this time just before fruiting. Later in the spring populations would begin to move east toward the Pecos River.

In the summer, after the mescal harvest and processing, populations would move out into the Pecos River valley and the adjacent mid-elevation areas, the Chihuahuan Semi-desert grassland would be a logical place to forage and hunt based on the highest number of plant foods available. Plant foraging groups would probably shy away from the prairies and scrubland, given the low number of plant resources.

In the fall there are no extremely bad areas in the CFO in comparison to each other, but the prairies and scrubland still have the fewest species of plants available. Populations would be following game, collecting and processing mesquite pods, and any of a number of plants species available during this time of year.

In the winter, populations would not be at the higher elevations for extended lengths of time, most likely they would be again around the Pecos river and water sources where plants would still be available. Many of the foraging plants would be in seed by this time, and groups would be living off of stored food with hunting and some gathering of fresh vegetable foods.

Conclusions

The study of ancient plant use in southeast New Mexico is an elusive subject, due to the environmental and cultural context of the archaeological sites we study and the botanical practices of ancient cultures. The archaeological botanical dataset used in this summary is a unique demonstration of how merging large scale sampling, ecological information, and modern ethnographic plant use can be used to develop an understanding of prehistoric lifeways. While this data may not be conclusive in all cases, it provides a large amount of information that can be mined for hypothesis generation and testing.

Archaeologists have been collecting archaeobotanical samples from a majority of sites in the CFO region, and these data can be distilled down to a few basic patterns:

1. The Paleoindian, Early and Middle Archaic time periods have no to very little archaeobotanical data; therefore, we cannot say much about plant use for a large stretch of human history in the CFO region.
2. In the Late Archaic we have a few grasses, and a few food species present, with the data set consisting primarily of wood. This is most likely a reflection of the basic economic strategy of Late Archaic peoples (hunting more than gathering), but could also a problem of recovery, site preservation, and sampling.
3. In the Early Formative we see an explosion of plant use in the record with the most archaeobotanical information in comparison to all time periods. We see some small evidence of settled farming or gardening at a few archaeological sites, and the range of plants recovered becomes the greatest.
4. In the Late Formative the number of plant taxa drops, but we see a continuation of activities started in the Early Formative. Populations do seem to fluctuate in this time period, and this could be a reflection of cultural and ecological changes.
5. In the Post Formative we see the number of overall sites reduced but the same general pattern of plant use continues, with the most common taxa represented.

In conclusion, we can make broad interpretations of plant use by species or taxon, but inferring specific use from modern data requires a leap of faith on our part when applying this knowledge to the archaeologist past. We do not know with certainty that modern ethnographic documentation of plant use is the same as prehistoric use. It would be presumptuous to assume that plant use did not evolve and change over time for Native American groups in the Southwest and we know that to be the case anyway. This snapshot of plant use is informed by historic and modern ethnographic documentation, and the next section of this text will present 172 species in and around the CFO region, with specific uses and archaeological coverage.

Part II: The Plants

Paint: Used to paint stripes on buckskin.

Tools: Stalks fashioned into hoe handles. The sharp leave tips were used as needle and thread.

Weapon: Stalks used to make lance shafts.

Parry Agave

Mescal was one of the most prized foods for the Mescalero Apache tribe—hence their name—due to its excellent storage properties and the quality and quantity of the plants (Basehart 1960). Researchers have documented extensive commerce of this plant between the Apaches and outlying tribes, including the Hopi and Pueblo Indians of the Rio Grande Valley (Castetter 1935).

Parry Agave –flowers

Agave parryi Engelm. (AGPA4)
Parry Agave, Mescal
Maguey (Spanish)
Astaneh, *Naa'da* (Mescalero Apache)

Large flowers, blooming in the summer.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x						
Heart			x	x	x	x						
Leaves			x	x	x	x						
Thorn	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Shrubs forming colonies. Leaves ascending, 17–45 cm long by 4–12 cm wide. Leaves are grayish green, thick, rigid, and have edges with well-defined teeth. Flowering stalk 3–4.5 m tall. Yellowish green flowers erect on widely spaced branches. Flowers 5.5–6.7 cm long. Stamens exserted. Fruit capsules 3.5–5.0 cm long. Seeds 7–8 mm.

Phenology: Flowers mid spring to early summer.

Habitat: Guadalupe Mountains and foothills, Chihuahuan Semi-Desert Grassland.

Similar species: Synonyms include *A. parryi* var. *neomexicana* and *A. neomexicana*. ***Agave gracilipes*** is similar to *A. parryi* but has smaller flowers and blooms summer to fall. It was used similarly. ***Agave lechuguilla*** is the only Agave whose flowering spike has no branches (the flowers form along the main axis of the stalk; see page 76 for more on this species).

Fiber: Green *lechuguilla* leaves are pounded and the plant fibers separated and used for weaving and sewing. Products including rope, nets, baskets, and sandals were made.

Food: The Mescalero Apache were named for the food they made from mescal. Plant hearts and young leaves were roasted, sun-dried, used immediately, or stored. The "roots" were baked and eaten. Stalks were roasted or boiled and eaten. Leaf bases were pit cooked, made into cakes, dried, and eaten (Castetter 1935). Bulbous crowns of the mescal plant were baked in pits, which released the pulpy centers, then pounded into thin sheets and eaten. In the pits where the crowns were baked, the largest rock was placed in the center and a cross made on it from black ashes. While the mescal baked, the women were supposed to stay away from their husbands, and if the crown was not completely roasted when removed from the pit they were believed to have disobeyed (Castetter and Opler 1936).

Landscaping: Valued for its compact size, low water use, and low maintenance: Parry agave is evergreen. After several years it produces a 3.7-m stalk with bright yellow blooms. The plants usually die after blooming, as all leaf and root resources are put into the stalk, flowers, and seeds. Sometimes "pups" around the base of the dead mother plant can continue growing. It can be propagated by either offset or seed.

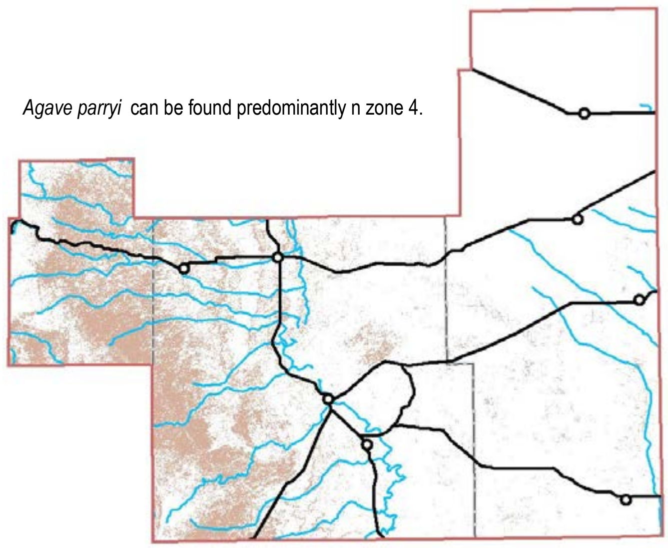
Medicine: Some tribes used agave to treat wounds, rashes, chapped lips, and sunburn.

Parry Agave –flowering stalk

Storage: The high sugar content hearts if properly stored could last for several years, the tools, fibers and weapons if stored properly, indefinitely.

Archaeology: The presence of agave roasting facilities are a common feature of the archaeological landscape in the slope of the Guadalupe Mountains in the western portion of the CFO district (Permian Quarterly Volume 2, Number 2, June 2014). Direct botanical evidence for agave use is rare in the CFO, with 13 sites showing carbonized remains from fiber, leaf, seed, stem, stalk, and other tissues. We can infer agave species were an important resource from archaeological features that are similar to agave roasting pits documented in ethnobotanical/ ethnographic accounts. Ring midden sites begin in the Early Archaic and become more common in the Formative (Condon 2002; Katz and Katz 2001). Castetter et al. (1938) summarize the use of the family extensively in North America, and of course give a full account of the traditional harvesting, processing, and storage of roasted agave hearts.

Agave parryi can be found predominantly n zone 4.



Parry Agave

Agave parryi Engelm. (AGPA4)
Parry Agave, Mescal

...continued


Agave lechuguilla: Flowers


Agave lechuguilla: In Bloom


Agave lechuguilla

Agave lechuguilla

Lechuguilla was an extremely important food source on the lower Pecos, which was used by CFO regional Apache groups (including the Mescalero as one of the groups) as a transportation corridor to/from the Rio Grande and Mexico camp/village sites. It was cooked almost identically to A. parryi. In raw form, like most agaves, it is considered to be toxic. It has to be cooked for an extended period of time to convert it to an edible form. In the Trans-Pecos region, particularly in areas where larger agaves were more readily available, *Lechuguilla* may have been passed over for larger agaves, simply for the amount of food mass that could be obtained…for about the same effort/cook time.

Archeological occurrence. The archeological deposits of the dry rockshelters in the Lower Pecos Canyonlands contain more lechuguilla plant fragments than perhaps any other single resource. For instance, countless cut leaf bases, central stem fragments, quids, flower stalks, and leaf fragments were recovered from the deposits at Hinds Cave. *Lechuguilla* fiber is part of many perishable artifacts from the area…

Food: As a food source, *lechuguilla* was sought out for the carbohydrates contained in the central stem and attached lower leaf bases, sometimes referred to collectively as the heart. The heart of the plant is rich in carbohydrates, but these are very complex, long-chain sugars that must be broken down by prolonged heating (baking) before they are edible. The baking is also needed to break down the toxic sap. Native peoples baked lechuguilla in earth-covered cooking pits known as earth ovens.

Although *lechuguilla* can be harvested and baked any time of the year, the maximum amount of sugars are present during wet periods just prior to the time a mature plant sends up its flower stalk.


Parry Agave -harvesting


Parry Agave –seed capsules

Agave parryi Engelm. (AGPA4)
Parry Agave, Mescal

...continued

Caution: Not Directly Edible

Although the hearts and leaves of *Agaves*, *Yuccas*, and *Dasylirion* plants were dietary staples for the Mescalero Apache, they are toxic raw. The toxic juice of raw agave leaves contains saponins, toxic soap-like compounds that were used as soap, and to kill fish. The plants also contain anti-nutrients such as calcium oxylate. To eat the plants, the toxins must be deactivated through a long baking process. The bitter toxins in *Agave lechuguilla* and *Nolina* species cannot be deactivated in the same way, so Native people did not consume the hearts and mature leaves of those plants (Tull 2013).

A Threatened Resource

While it is not a secret that the Mescalero Apache use the mescal agave, it is not ubiquitous and is sensitive to fire and over-exploitation. A mature agave can take over 10 years to become large enough to harvest. It is imperative that wild agave be left to flourish and only traditional uses should be allowed.


Parry Agave –preparation by trimming leaves from heart.

Banana Yucca

Banana Yucca –fruit

Banana Yucca –fruit

Yucca baccata Torr. (YUBA)
Banana Yucca
Gushk'ąne (Mescalero Apache)

Wide, stout leaves, the edges usually with peeling threads.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flowers			x	x	x	x						
Fruit	x	x							x	x	x	x
Leaves			x	x	x	x						
Root	x	x	x	x	x	x	x	x	x	x	x	x
Stalk	x	x	x	x	x	x	x	x	x	x	x	x
Thorn	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Leaves bluish green, erect, U-shaped, 30–100 cm long by 2–6 cm wide. Leaf edges with peeling fibers. Flowering stalk within or above leaves, 60–80 cm long. Large 5–13 cm long, yellow-white or pink-white flowers hang from small branches. Fruits hang in a grape-like cluster. Each fleshy/succulent fruit can be 5–23 cm long by 4–7 cm wide. Fruits do not open. Many small, black, rough seeds up to 1 cm in diameter.

Phenology: Flowers March to June.

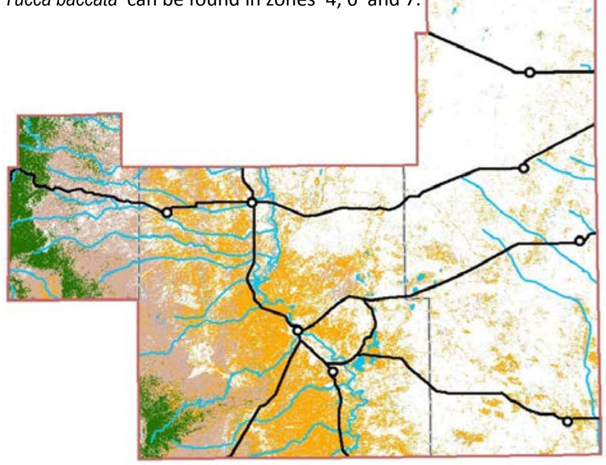
Habitat: Chihuahuan Desert Scrub, Chihuahuan Semi-Desert Grassland, up into piñon-juniper woodlands and ponderosa pine forests.

Fiber: The small, red, side roots were used for basket work, while the leaf fibers were preferred for twine or rope (Basehart 1960).

Food: One of the four main favored foods of the Lipan and Mescalero Apache (Basehart 1960; Opler 1935). Nearly as important as the mescal. The fruit was valued for its storage ability and relative abundance. Tender central leaves cooked in soups, boiled with meat, and used in similar fashion as other yuccas (Castetter and Opler 1936). However, the broad leaves were only eaten if they could be obtained during the summer before the summer rains, since they became bitter after (Castetter and Opler 1936).

Hygiene: The roots were used to make soaps and shampoos.

Yucca baccata can be found in zones 4, 6 and 7.



Yucca baccata Torr. (YUBA)
Banana Yucca
Gushk'ąne (Mescalero Apache)

...continued

Storage: The processed fruit could be stored for many months in the proper conditions. Other parts could be stored indefinetly given the proper conditions.

Archaeology: This species has not been identified specifically in the CFO region

Banana Yucca

Banana Yucca –leaf section

Banana Yucca –flower

Banana Yucca –flower

Banana Yucca –seeds

Plains Yucca—emerging flower stalk

Plains Yucca –seedlings

Plains Yucca –fruit

Yucca campestris McKelvey (YUCA)
Plains Yucca

Thin, flexible leaves on a short grassland yucca.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x						
Leaves					x	x						
Root					x	x						
Stalk					x	x						

Botanical Description: Often forming small colonies. Leaves linear, rigid, U-shaped, 40–60 cm long by about 1 cm wide. Leaf edges with peeling fibers. Flowering stalk within or just above leaves, 50–100 cm long. Medium 5-cm-long greenish white flowers hang from branches along stem. Fruit capsules can be 5–8 cm long by 3–5 cm wide, usually found erect, opening upward along the stalk or small branches. Seeds black, glossy, thin, 9–12 mm by 8–9 mm.

Phenology: Flowering spring (May–June).

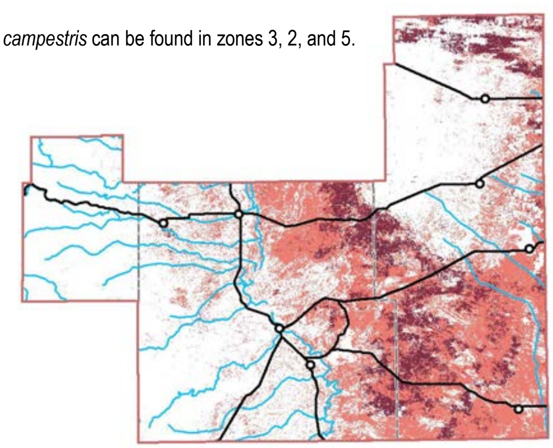
Habitat: Sandy grasslands including Sandhill Shrubland, Sandy Plains Semi-Desert Grassland, Mesquite Scrub, roadsides, widespread.

Similar species: Often confused with ***Yucca glauca*** in the region, which has a flowering stalk without well-developed branches. It grows farther north in the Great Plains Shortgrass Prairie.

Food: The stripped flower stalk was placed on embers and roasted for about 15 minutes. The outer charred surface was peeled off, and the central portion eaten. Stalks were eaten raw or boiled, dried, and stored for use as a "vegetable." Usually saved for winter and eaten as a bread or cake (Castetter and Opler 1936). Lipan Apache boiled flowers with onions to make a soup (Opler 1935).

Archaeology: Yucca stem has only been identified once in southeastern New Mexico to date. The nonspecific morphology of this group makes it difficult to identify from carbonized remains.

Yucca campestris can be found in zones 3, 2, and 5.



The fleshy fruit is edible when it has small brown marks of sugar and the fruit's skin is light green. However, the seeds may cause gastrointestinal discomfort (Kane 2011).

Yucca elata Engelm. (YUEL)
Soaptree Yucca
Ii’gaa’e, íígaaé (Mescalero Apache)

Leaves relatively thin and flexible on a treelike yucca.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x					
Fruit								x	x	x		
Seeds									x	x		
Leaves			x	x	x	x	x	x	x			
Root			x	x	x	x	x	x	x			

Botanical Description: Tree up to 4.5 m, often solitary or in small colonies. Stems thick, 100–150 cm. Leaves pale green, flexible, 25–95 cm long by 0.2–1.3 cm wide. Leaf edges have curly fibers. Flowering stalk 70–150 cm long with cream-colored flowers hanging on branches. Flowers are 3.2–5.7 cm long by 1.3–3.2 cm wide. Fruits are usually found erect, opening upward. Fruit capsules are 4–8.2 cm long by 2–4 cm wide. Seeds are dull black, thin 7–11 mm diameter.

Phenology: Flowers mid-May to mid-July, fruit ripens August to October, seed capsules open in September and October.

Habitat: Chihuahuan Desert Scrub foothills and Chihauhan Desert Thornscrub.

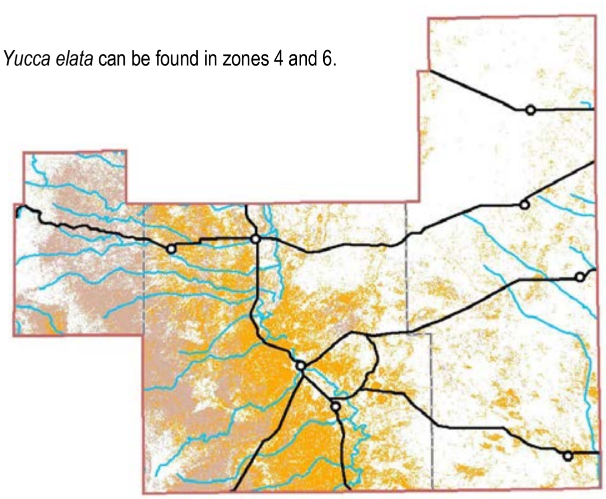
Ceremonial: “The Yucca plant is as useful today as it was in the past to the Mescalero Apache as an important part of their traditional and religious practices.” (Medicine man Paul Ortega, 2011.)

Food: Yucca was gathered middle of March to the end of the summer. Baked similar to mescal overnight until it was yellow to brown in color and known as *nigache* (Castetter and Opler 1936). Flowers were boiled to remove saponins and eaten as a vegetable (Castetter and Opler 1936).

Medicine: A poultice of roots and leaves can be used to treat insect bites. The raw fruit has a laxative effect. The trunk is used to make a tobacco mix and a sore throat chew. Great for the intestinal tract.

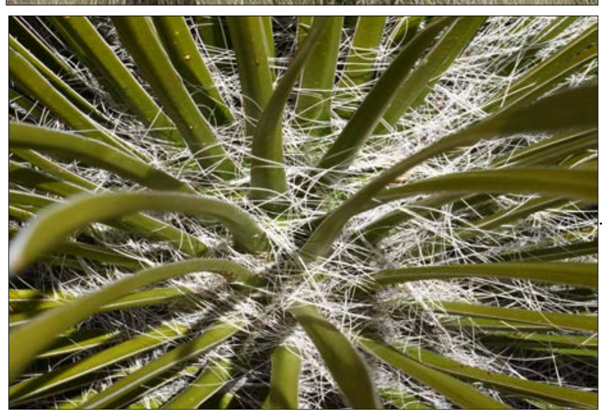
Storage: The processed root can be stored for several months, while the flowers are used immediately with little potential for storage.

Yucca elata can be found in zones 4 and 6.



Seed Pod

Soaptree Yucca



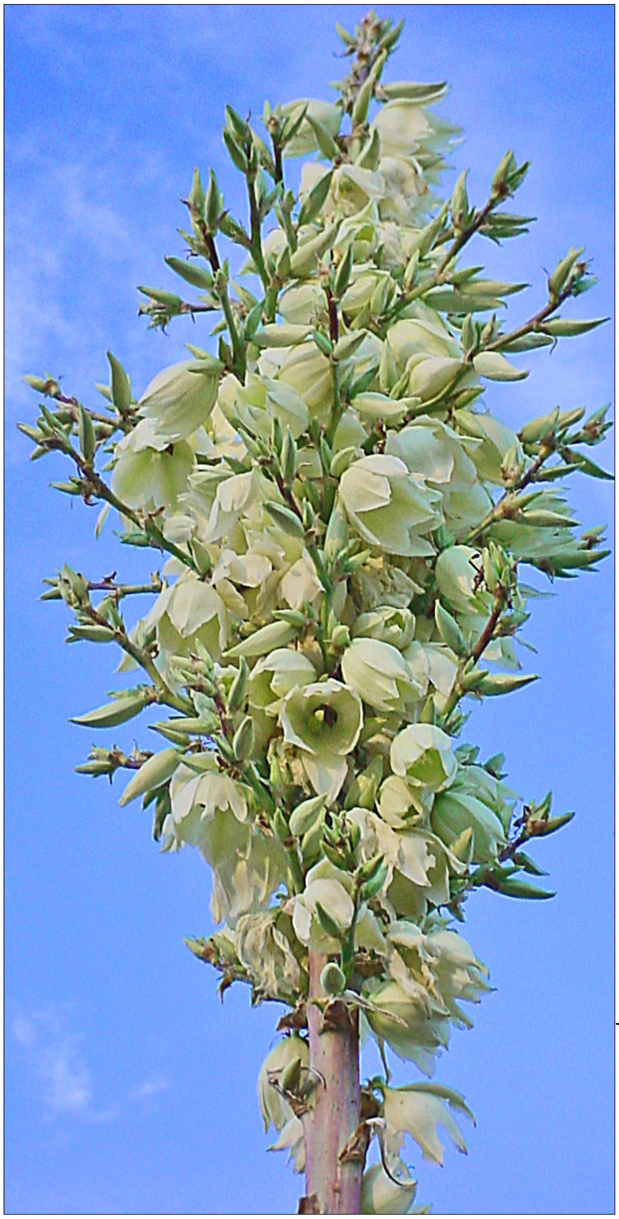
Soaptree Yucca –leaves

Archaeology: The evidence for yucca is more extensive than for agave, but both species are so similar in stem, leaf, and fiber morphology, they could be easily confused in carbonized specimens. There have been 60 sites with yucca/agave materials recovered, two sites with leaf fragments, one with a stem/stalk fragment, and 57 sites with leaf base fragments. The distribution of these remains are primarily in the Early Formative (39 sites), but can be found in the Early Archaic (1 site), Late Archaic (12 sites), and in the Late Formative (9 sites). The importance of

Agave and *Yucca* as carbohydrate sources, with storage potential, cannot be underestimated. However, since both groups propagate naturally, there would be a limit to the amount of each species that could be harvested and used. The potential for overharvesting would always be present if this resource consistently was intensively exploited for many decades.

Soaptree Yucca –stem and root

Soaptree Yucca –leaf section



Soaptree Yucca –flowers

Soaptree Yucca –flower

Yucca torreyi Shafer (YUTO)
Torrey's Yucca

Leaves thick, stout, and rigid on a treelike yucca.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower		x	x	x	x							
Root							x	x	x	x	x	x
Seed							x	x	x	x	x	x

Botanical Description: Tree up to 7 m tall, often forming colonies. Leaves point at all angles. Stems, occasionally branched, are only 15 cm in diameter. Leaves thick and rigid, yellowish to bluish green, usually U- or V-shaped in cross section, 40–130 cm long by 1–7 cm wide. Leaf edges have fibers. Flowering stalk 180 cm long with hanging cream-colored flowers on branches. Flowers are 3–8 cm long by 1–3 cm wide. Fruits hang like grapes and do not open. Fruits are fleshy/succulent and 4–18 cm long by 2–5 cm wide. Seeds black, 5–14 mm diameter, but only 1–5 mm thick.

Phenology: Flowering mid-winter to spring.

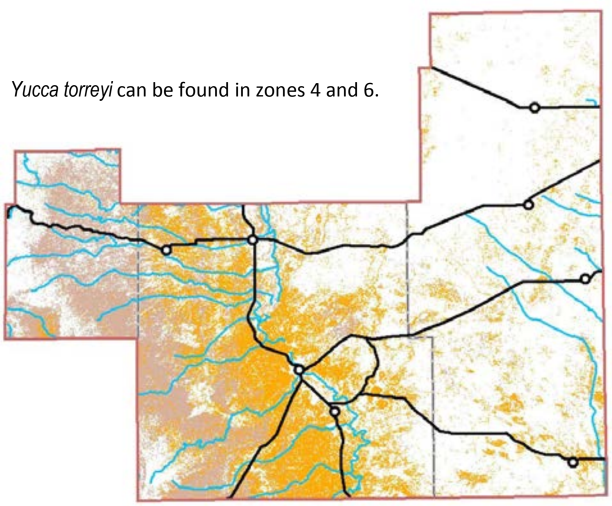
Habitat: Chihuahan Semi-Desert Grassland and Chihuahuan Desert Thornscrub primarily west of the Pecos River.

Similar Species: This species has also been called *Yucca treculeana*. ***Yucca faxoniana*** is a common tree ornamental, similar to *Y. torreyi* but with larger flowers 4–12 cm long.

Food: Seeds prepared and eaten as a "bread cake" (Castetter and Opler 1936).

Storage: Seeds could be stored for many years in the proper conditions.

Archaeology: Yucca stem has only been identified once in Southeastern New Mexico to date. The nonspecific morphology of this group makes it difficult to identify.



Yucca torreyi can be found in zones 4 and 6.

Torrey's Yucca

Torrey's Yucca

Torrey's Yucca–flowers

Redroot Amaranth

Amaranthus retroflexus L. (AMRE)
Redroot Amaranth, Alegria

Leaves are grayish-green because of tiny hairs.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x	x	x	
Leaves									x	x	x	x
Seed									x	x	x	x

Botanical Description: Stems usually erect, reddish near base, with or without many branches, 20–150 cm tall. Leaves oblong with wedge-shaped base, 2–15 cm long by 1–7 cm wide, edges may be slightly undulating. Flowers are in small green balls in spikes from leaf bases and from the top of the plant. Fruit is a thin-walled, one-seeded oval, 1.5–2.5 mm in diameter that breaks open around the middle. Seeds are reddish brown to black, smooth, lens-shaped, 1–1.3 mm diameter.

Phenology: Flowers summer–fall.

Habitat: Disturbed areas, especially near water.

Similar Species: Flowering spikes at tip of plant instead of from leaf bases, as in *A. albus*. In both species, the entire plant is edible.

Uses: Similar to *A. albus.*

Storage: Similar to *A. albus.*

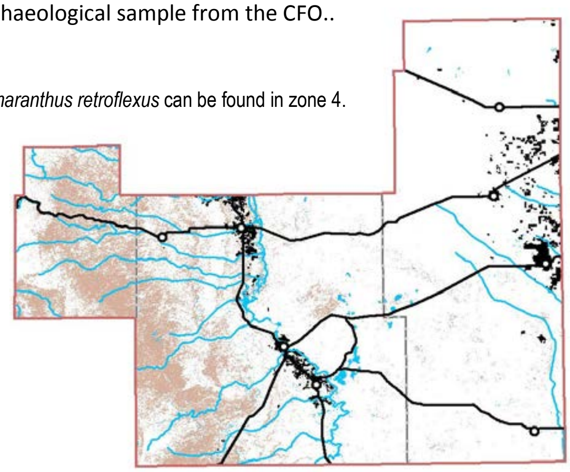
Archaeology: This species has not been identified in archaeological sample from the CFO..

Amaranthus—The "Fourth Sister"

Amaranthus is the same genus as commercial Amaranth. Amaranth has been called "the fourth sister" because of its traditional importance as a staple after the "three sisters" corn, beans, and squash. It is considered a weed primarily because it is a drought-tolerant annual that reseeds well, forming extensive colonies along fence lines and farm fields. It flourishes in fertile soil, but can grow well in all conditions. A single plant can produce 200,000 seeds.

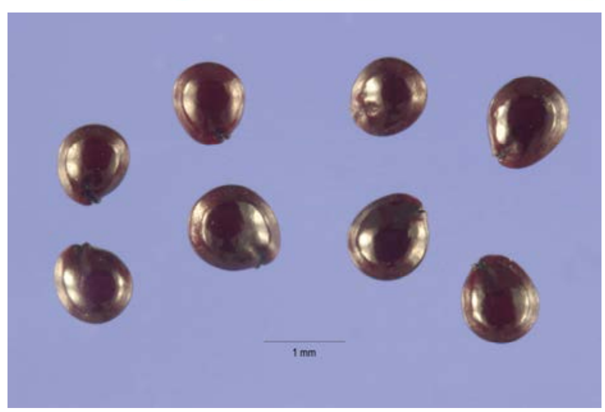
Greens, roots, and seeds are all edible. Young greens can be added to a salad or dehydrated and used to make "kale chips." Greens and stalk are edible before drying up when the plant goes to seed. The greens are noted for being especially high in manganese, magnesium, iron, and phosphorous. The root can be eaten boiled or steamed like potatoes. The seeds can be harvested in the fall by gathering whole stalks and winnowing the seeds from the chaff. The seeds are an excellent source of carbohydrates and protein.

Miniature popcorn can be made by heating the seeds on a cast iron skillet. The Mexican beverage *atole* is traditionally made from popped amaranth. A traditional Mexican confection called "Alegria" (happiness) is made of honey and toasted amaranth. Seeds can also be sprouted and added to salad. They must be exposed to cold temperatures (layered) before they will sprout.



Amaranthus retroflexus can be found in zone 4.

Redroot Amaranth – flower



Redroot Amaranth – seeds

Amaranthus albus L., (AMAL)
Prostrate Pigweed, Alegria

Leaves lack hairs or, sometimes, have few gland-dotted hairs.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Leaves						x	x	x	x	x	x	
Root/Tuber								x	x	x		
Seed								x	x	x		
Medicine				x	x	x	x	x	x	x		
Flower							x	x	x	x		

Botanical Description: Stems erect or sprawling, much-branched and bushy, 10–70 cm tall. The first two leaves have a reddish hue, and as it grows it produces alternate leaves with prominent veins. The taproot has many side branches. Leaves oblong, tapering to base, edges smooth or undulating. Flowers are small green balls in spikes arising from leaf bases. Fruit is a thin-walled, one-seeded rough oval capsule 1.5–2 mm in diameter that breaks open around middle (circumscissile). Seeds are shiny reddish brown to black, lens-shaped, 0.6–1 mm diameter.

Phenology: Flowers summer–fall.

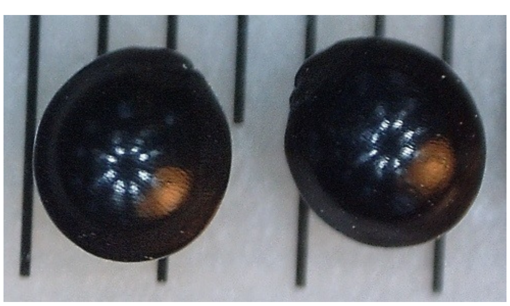
Habitat: Disturbed areas.

Food: Leaves, roots and seeds are edible, although the leaves of this species may be more bitter than other amaranths. Ground by Mescalero Apache into flour and used to make bread (Moermon 1998). Seeds are nourishing raw, or sifted seeds can be made into flour to make breads, waffles, or pancakes (Angier 1994). For the Aztecs, amaranth rivalled maize as the most important crop (Tull 2013).

Medicine: Also known as “Love lies bleeding” in flower essence formulas, it is used as a mild astringent (Angier 1994). This plant is rich in minerals, Vitamin A, Vitamin B, niacin, thiamine, riboflavin, and Vitamin C. The juice or a poultice of leaves can aid the healing process of a range of skin conditions.

Storage: Seeds can be stored for several years, while the greens need to be used immediately.

Archaeology: Carbonized *Amaranthus* seeds have been found in three archaeological sites in the CFO region. While this plant does have many food uses, the potential for inclusion in the archaeological record is low, due to its use as a green. In cultures where *Amaranthus* is used extensively, it is found in abundance in samples; this level of presences suggests *Amaranthus* species were minor economic plants.



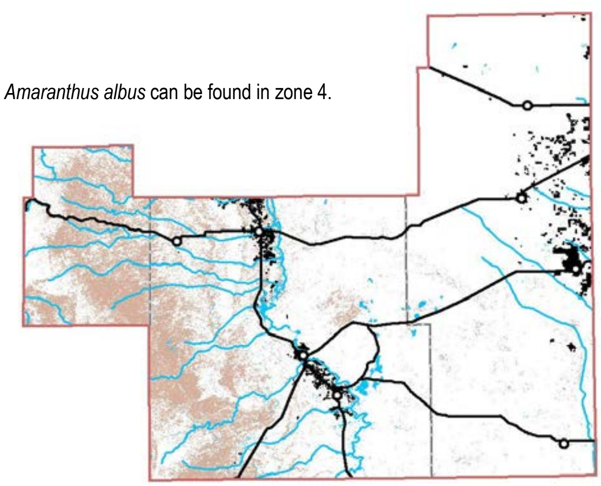
Seeds.. Longer marks =1 mm

Prostrate Pigweed

The seeds and greens from this plant were cooked with game meat, green chile, and animal bones (Tierra 1998; Moermon 1998). The greens are similar to spinach and were fed to pigs, hence the name “pigweed.”

Prostrate Pigweed –leaves

Amaranthus albus can be found in zone 4.



Skunkbush Sumac

Skunkbush Sumac –flowers

Skunkbush Sumac –deciduous leaves

Skunkbush Sumac - fruit

Skunkbush Sumac –leaf

Rhus trilobata **Nutt. (RHTR)**
Skunkbush Sumac, Lemonadeberry

A spreading shrub with three leaflets.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Bark	x	x	x	x	x	x	x	x	x	x	x	x
Flower			x	x								
Fruit							x	x	x	x		
Stem	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Deciduous shrubs with spreading branches, sometimes forming thickets, up to 2 m tall. Bark gray, twigs brown, hairy or smooth. Leaves with 3 leaflets on stalks 8–15 mm long. Flowers in a short dense spike, each flower 3 mm long, pinkish to pale yellow. Fruit 6–8 mm diameter, dull orange to dark red, sparsely hairy and/or glandular.

Phenology: Flowers early in spring before leaves, fruits appear in summer.

Habitat: Pinyon-juniper woodland.

Food: Malic acid gives apples their tart flavor and is also found in *Rhus* fruits (Tull 2013). Fruit is eaten fresh or is ground into a form of meal (Castetter 1935). The pulp was mixed with water and sugar and cooked to make jam (Castetter 1936), and berries were used to make a non-intoxicating beverage (Castetter and Opler 1936).

Medicine: Lipan Apache mixed the berries with red paint for skin eruptions (Opler 1935). Other groups used an infusion of the leaves as an emetic and stomach wash and the berries as a mouthwash (Swank 1932). The dried berries were ground and dusted onto smallpox pustules or used as a toothache remedy (Johnston 1987). Buds were used on the body as a deodorant (Whiting 1939).

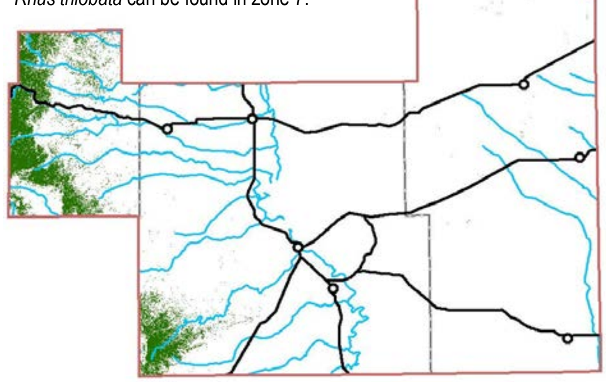
Veterinary: The fruit was used for horses with urinary troubles and to prevent tiredness (Hart 1981).

Weaving: Twigs were used for basketry.

Storage: Dried fruit would be storable for several years.

Archaeology: This species has not been found in archaeological samples in the CFO region.

Rhus trilobata can be found in zone 7.



Rhus microphylla Engelm. ex A. Gray (RHMI3)
Littleleaf Sumac

A dense shrub or small tree with small compound leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x							
Fruit						x	x	x				
Seed						x	x	x				
Stem						x	x	x				
wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Densely branched shrub or small tree, to 4 m tall. Branches gray and stiff. Leaves are alternate, compound with five to nine leaflets, each leaflet 6–9 mm long, 2–5 mm wide. Flowers are small, in dense spikes, 8–12 mm long, pink and cream-colored. Fruits are ovals, 5–7 mm in diameter, dark red to orange, with sticky hairs, drying wrinkled.

Phenology: Flowers before first leaves.

Habitat: Swales and waterways, warm desert washes, and Chihuahuan Semi-Desert Grassland.

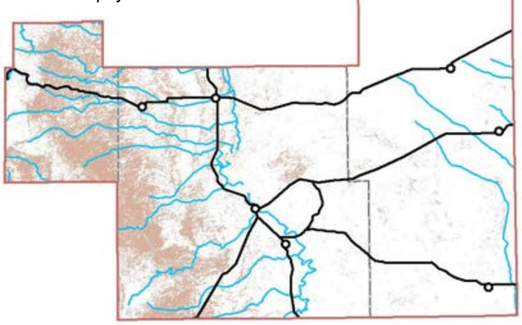
Similar Species: ***Rhus trilobata*** is a smaller shrub with much larger leaflets in threes. Both have similar uses.

Uses: Fruit is eaten fresh or is ground into a form of meal (Castetter 1935). The pulp was mixed with water and sugar and cooked to make jam (Castetter 1936), and berries were used to make a non-intoxicating beverage (Castetter and Opler 1936).

Storage: The dried fruit could be stored for several years.

Archaeology: *Rhus* species have been found in six sites across the CFO region, with wood and seeds found in primarily Post Formative contexts (four sites), with one seed found in the Late Formative. This distribution makes *Rhus* taxon a minor economic species in the CFO region.

Rhus microphylla can be found in zone 7.



The Sumac family consists of shrubs and small trees. Leaves are alternate, pinnately compound or trifoliate. Flowers are small. Fruit is a berry. Some people are allergic to all species, including mango and cashew. Most people are allergic to at least one species in this family, poison oak (*Toxicodendron* sp.), which is thankfully uncommon in New Mexico.

Littleleaf Sumac

Littleleaf Sumac—leaves

Littleleaf Sumac –berries

Littleleaf Sumac –flower

Fringed Twinevine

The milkweed family consists of small perennial herbs and vines with milky sap, fleshy and leathery opposite leaves, and unique flowers.

Fringed Twinevine –flower

Fringed Twinevine –flower

Funastrum cynanchoides (Decne.) Fringed Twinevine Schltr. (FUCY)

A milkweed vine with milky sap.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Sap					x	x	x	x	x	x		

Botanical Description: Perennial herbaceous vine, stems smooth or sparsely hairy, milky sap. Leaves are variable: lance-shaped to elongate heart-shaped, 3–4 times as long as broad, smooth. Flowers in bunches of 5–30, each flower 5–7 mm long, predominantly white fading to purple. Bean-like fruits are 6–12 cm long with fluffy seeds.

Phenology: Flowers in the summer with monsoon rains.

Habitat: Twining on shrubs in Mesquite Scrub and Chihuahuan Semi-Desert Grassland.

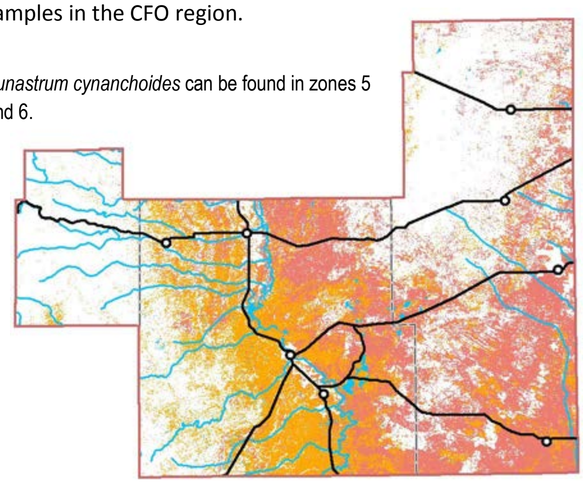
Similar Species: ***Matelea producta*** is a twining vine with sticky hairs, heart-shaped leaves with elongate tips, and 1-cm-long flowers. It occurs throughout Southeastern New Mexico in grasslands and in thickets alongside streams. ***Matelea biflora*** is another milkweed vine with heart-shaped leaves, but it lacks elongate tips. It grows in shortgrass prairies in the Great Plains and along roadsides.

Uses: Some Native peoples reportedly made chewing gum by cooking the milky latex exuded from cut stems. This plant contains toxic compounds and this practice is not recommended (Tull 2013).

Storage: The gummy resin could be stored for up to a year.

Archaeology: This taxon was not found in archaeological samples in the CFO region.

Funastrum cynanchoides can be found in zones 5 and 6.



Fringed Twinevine –fruit

Asclepias asperula (Decne.)
Spider Milkweed
Woodson (ASAS)

Pointed, opposite leaves and milky sap.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Fiber					x	x	x	x	x	x	x	x
Flower						x	x	x				
Leaves			x	x	x	x	x	x	x	x		
Sap						x	x	x	x	x		
Stem						x	x	x	x	x	x	x

Botanical Description: Perennial herb, stems often not erect, unbranched, 10–80 cm tall, milky sap. Leaves irregularly alternate, linear to lance-shaped, 5–19 cm long by 6–27 mm broad. Flowers occur in a ball at the end of stems, greenish white with purplish centers. The fruit is an erect "beanpod" with fluffy seeds.

Phenology: Flowers in the summer with monsoon rains.

Habitat: Canyons in the foothills of the Guadalupe Mountains, disturbed areas, mixed shrubland-grassland, and any place with lots of bare ground; Mesquite Scrub, Chihuahuan Semi-Desert Scrub.

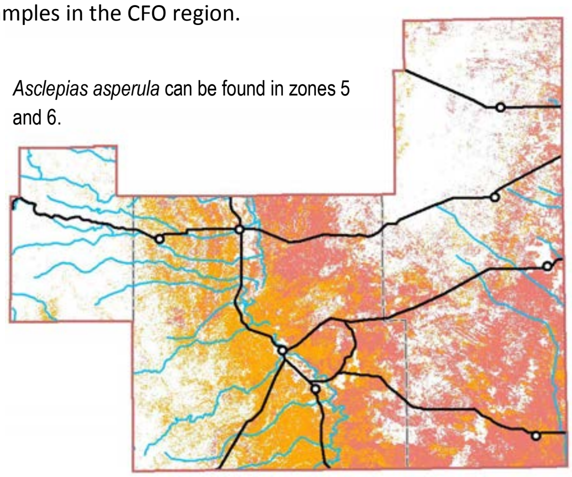
Similar Species: ***Asclepias latifolia*** is a milkweed with large, circular to oblong leaves 5–14 cm long by 4–12 cm broad. Flowers are in clusters among the leaves and at the tips of the stems. ***Asclepias subverticillata*** has thinner linear leaves and bunches of small white flowers. It is so toxic that only
2–3 ounces can kill a sheep (Tull 2013).

Medicine – All milkweeds contain toxic compounds and should be handled with care. Native peoples used these plants to treat respiratory issues including bronchitis and sinusitis, and also as a mild heart stimulant, although too much can act as a laxative (Kane 1994; Moore 1997).

Other uses – Native people made clothing from the strong fibers in milkweed stalks. The silky down from seeds was harvested to make life preservers during World War I (Tull 2013).

Storage: The sap has little storage potential, fibers if stored properly could l;ast indefinetly.

Archaeology: This taxon was not found in archaeological samples in the CFO region.




Spider Milkweed

Plants in the milkweed family contain toxic compounds, such as cardiac glycosides, which affect heart function. They have been used to make poison arrows, rat poisons, and (in low doses) heart tonics. Purified extracts and synthetic analogues are now used in the treatment of heart failure and cardiac arrhythmias.


Spider Milkweed


Spider Milkweed –flower

Desert Holly

Desert Holly - leaves

Desert Holly - flower

Acourtia nana (A. Gray) Reveal & King (ACNA2)
Desert Holly, Desert Peony
Izee' bit'aa' dalghadz i (Mescalero Apache)

Prickly, holly-like gray-green leaves growing low.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x						
Leaves		x	x	x	x	x	x	x	x			

Botanical Description: Perennial forb 5–15 cm tall, stems woody at base. Leaves stalkless, alternate, spine-toothed, holly-shaped. Showy white-pink flowers, single at the branch tips, opening briefly.

Phenology: Flowers March–June.

Habitat: Mesquite Upland Scrub, Chihuahuan Semi-Desert Grassland, and Mixed Desert Thornscrub.

Similar species: ***Acourtia wrightii*** also grows in the CFO. It is similar in most respects but grows much higher, 30–120 cm tall.

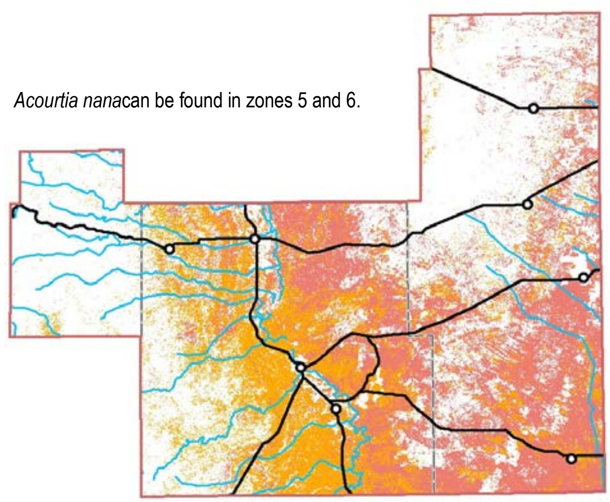
Medicine: (Apache, Mescalero) Desert Holly is made into a tea that is said to be good for mending broken bones. (Mescalero Apache Tribe 2014, pg. 23).

Storage: The dried leaves could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

This plant is typically found growing around the edges of playas in the CFO region and is used by some BLM field employees as an identifying marker of such areas. The bloom has a fragrant scent. When the plant dies back, the dried leaves make an almost identical sound to that of a rattlesnake rattle when the wind blows and shakes the leaves.

*Acourtia nana*can be found in zones 5 and 6.



Artemisia carruthii Alph. Wood ex Carruth, (ARCA14)
Carruth's Sagewort
Tl' u libayí (Mescalero Apache)

Narrowly divided, silvery-hairy leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x	x			
Seed										x	x	

Botanical Description: Perennials 15–40 cm tall, faintly aromatic. Stems mostly 3–8, ascending, sparsely to densely hairy. Leaves gray-green, narrow, 1–25 mm long by 5–10 mm wide, divided into 3–5 lobes, densely gray-hairy on the undersides, sparsely gray-hairy on the upper surface. Flower heads usually nodding, grouped along branches 10–30 cm long. Flower heads small, 2–2.5 mm by 1.5–3 mm, gray-hairy. Petals pale yellow, 1–2 mm.

Phenology: Flowers mid-summer until early fall.

Habitat: Open sites, sandy soils, grasslands. Spreads by underground roots and grows in loose patches.

Similar species: ***A. ludoviciana*** looks quite similar but has erect flowers. ***A. biennis*** is annual or biennial, glabrous, with compound serrate leaves. ***Ambrosia psilostachya*** has green divided leaves and is often mistaken for an *Artemisia* because its nodding flowers also lack petals. *Ambrosia* has become infamous for hay fever sufferers due to its copious pollen. It was cultivated by some Native peoples for its nutritious seeds (Tull 2013).

Food: (Apache, White Mountain) Species used for food (Reagan 1929 pg. 155).

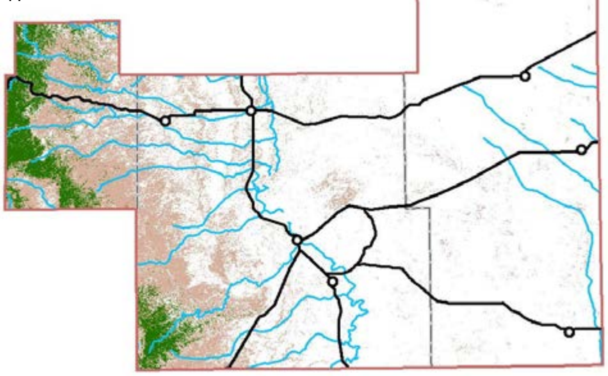
Storage: The dried stem and leaves could be stored for several years.

Archaeology: *Artemisia* wood has been found 19 times in the CFO district from sites dating to the Early (5 sites) and the Late Formative (3 sites). It is probably of minor economic importance as a fuel source.

Carruth's Sagewort

Carruth's Sagewort –stem

Artemisia carruthii can be found in zones 4 and 7.



Mugworts, sageworts, and sages are profilically used as smudge plants. All of the Apache cultural groups use sage smudge prolifically…from almost any "sage like" plant including *Artemsia* and *Senecio flaccidus* (each has their cultural preferences but will utilize what is at hand). When European epidemics were introduced to the New World, *Artemisia* species were widely used as both medicine and fumigants to help check the spread of disease by a great many indigenous cultural groups. This was "widely disseminated" plant knowledge. Due to the insect repellant qualities of *Artemisia* spp., as well as the antiseptic and antibacterial qualities, there is scientific evidence that supports such uses of the genus. The Apache utilize it for both physical and spiritual purification in modern times, much like other indigenous cultural groups.

Sand Sagebrush

Artemisia filifolia Torr. (ARFI2a)
Sand Sagebrush

A shrub-like plant with soft, thread-like leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower								x	x			
Leaves	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Shrubs 60–180 cm, rounded, faintly aromatic. Stems are green or gray-green. Leaves gray-green, linear, 2–5 cm long by 1–2.5cm wide, entire to 3-lobed, lobes threadlike (less than 1 mm wide). Flowers along branches 8–15 cm long. Flower heads 1.5–2 mm by 1.5–2 mm, densely hairy. Petals pale yellow, 1–1.5 mm, smooth.

Phenology: Flowers late summer–early winter.

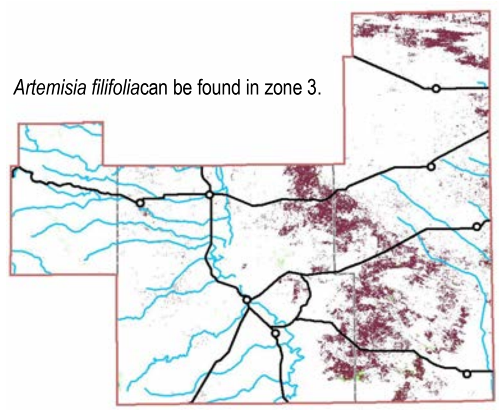
Habitat: Anywhere with deep sand soils, especially Sandhill Shrubland.

Similar Species: ***Artemisia frigida*** is another whitish-leaved *Artemisia*. It grows to the north in Great Plains Shortgrass Prairie and sometimes Pinyon-Juniper Woodland.

Dye: Tull (2013) reports this plant was used to produce a yellow to dark brown dye.

Storage: The dried plant could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.



Sand Sagebrush

Sand Sagebrush –stems

Sand Sagebrush : Detail of flower

Artemisia ludoviciana Nutt. (ARLU)
Louisiana Sagewort
Ch'íńdeezee' (Mescalero Apache)

Similar to *A. carruthii* but with mostly entire, wider leaves, not linear-divided like in *A. carruthii*.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x	x			
Leaves	x	x	x	x	x	x	x	x	x	x	x	x
Stem						x	x	x	x	x	x	x

Botanical Description: Perennial herbs, 20–80 cm tall, aromatic, spreading by underground roots. Stems erect, gray-green, woolly. Leaves alternate, gray-green, linear elliptic, 1.5–11 by 0.5–4 cm, entire or lobed, hairy. Flower head erect or nodding, along branches 5–30 cm long, 2–4 mm by 2–5 mm, gray-green, densely hairy. Petals yellow, sometimes red-tinged. Fruits less than 0.5 mm, smooth.

Phenology: Flowers mid-summer until early fall.

Habitat: Open sites with sand or bare ground, Mesquite Scrub.

Similar Species: ***Artemisia dracunculus*** (tarragon or wormwood) has shallowly lobed leaves without hairs. It and the other ***Artemisia*** were used similarly.

Beverage: Leaves and young stems boiled to make a non-intoxicating beverage (Castetter and Opler 1936).

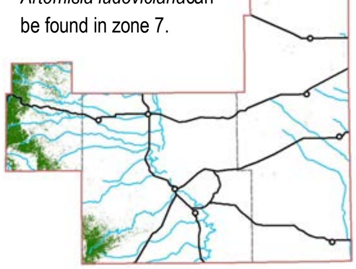
Medicine: (Apache) made bitter drink from white sage, which they used to reduce phlegm and to relieve a variety of lung and stomach complaints, usually, they chewed the stem and leaves and swallowed the juice. (Vestal and Shultes 1939). The Kiowa-Apaches used a thin, sharp-pointed section of the stem as a moxa to relieve headaches or other pain (Jordan 1965). Some tribes used root decoctions for children with colic, dysentery, and urinary problems (Bocek 1984). An infusion of stems and leaves was used on open sores, as an eyewash for eye problems including snow blindness, swollen legs and feet, and rheumatism (Hart 1982). A poultice of mashed, dampened leaves was applied to the forehead for headaches (Turner et al. 1980). Leaves were used in diapers or used as a diaper for diaper rash and skin rawness, and as a wash for colds, and for babies with chickenpox to help the itching (Turner et al. 1980).

Food: (Apache, Chiricahua & Mescalero) Sage used to flavor meats (Castetter and Opler 1936, pg. 47).

Veterinary: A decoction of the plant was used by some tribes after injuries to wash horses' legs every day until healed (Turner et al. 1980).

Storage: The dried plant could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.



*Artemisia ludoviciana*can be found in zone 7.

Louisiana Sagewort

Louisiana Sagewort –leaf

Louisiana Sagewort –flower

Louisiana Sagewort –flower


New Mexico Thistle


New Mexico Thistle –leaves

Cirsium neomexicanum A. Gray (CINE)
New Mexico Thistle

Flower heads are wider than tall, and covered in cobwebby hairs.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x					
Leaves				x	x	x						

Botanical Description: Biennials 40–120 cm tall with a large taproot. Stems are solitary, erect, thinly gray-hairy, with ascending branches. Leaves are 6–35 cm long by 1.5–7 cm wide, shallowly to deeply lobed, surface gray-hairy, with spines 5–15 mm. Flower heads 1–6, solitary on erect branches 5–30 cm long, heads are 2–3 cm by 2.5–5 cm with spreading spines. Petals white to pale pink 18–27 mm. Fruit 5–6 mm, dark brown, oval, smooth, slightly flattened, with many feather-like bristles 15–20 mm long at the top.

Phenology: Flowering March–July.

Habitat: Dry areas, roadsides. Less common than other Cirsium species in the CFO region.

Medicine: Used similarly to other ***Cirsium*** species. Seeds (with fluff removed) can be blended to make "milk." Milk thistle (***Silybum marianum***) has been traditionally used in this way in addition to its medicinal uses (Blair 2014).

Storage: Seeds and dried plant could be stored for several years.

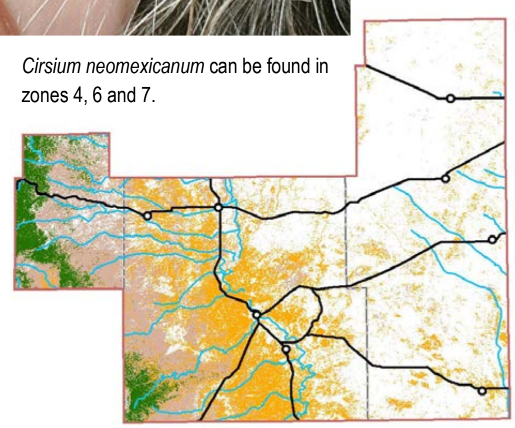
Archaeology: *Cirsium* has been found once in the CFO district from one undated site. It is probably of minor economic importance.

Identification Tip:

Flower head looks more "bushy" because spines are more strongly spreading than on *C. ochrocentrum*, allowing flower to open more (wider than tall).


New Mexico Thistle –seeds


New Mexico Thistle –flower buds


Cirsium neomexicanum can be found in zones 4, 6 and 7.

Cirsium ochrocentrum A. Gray (CIOC2)

Yellowspine Thistle

Flower heads are larger, and petals are longer than *C. neomexicanum*.
Flowers usually taller than wide.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x	x					
Leaves				x	x	x						

Botanical Description: Biennial or perennial 30–80 cm tall, stems 1–20, ascending, densely gray-hairy, branches few. Leaves gray-hairy, 5–15 cm by 2–8 cm, 8–15 lobes with spines 5–20 mm. Flower heads few on erect branches 0–4 cm long, heads are 2.5–4.5 cm by 2.5–4.5 cm, with only slightly spreading spines. Petals white or pale to brilliant pink, 25–45 mm. Fruit 7–8 mm, light brown, oval, smooth, with many feather-like bristles 25–30 mm long.

Phenology: Flowers April–July.

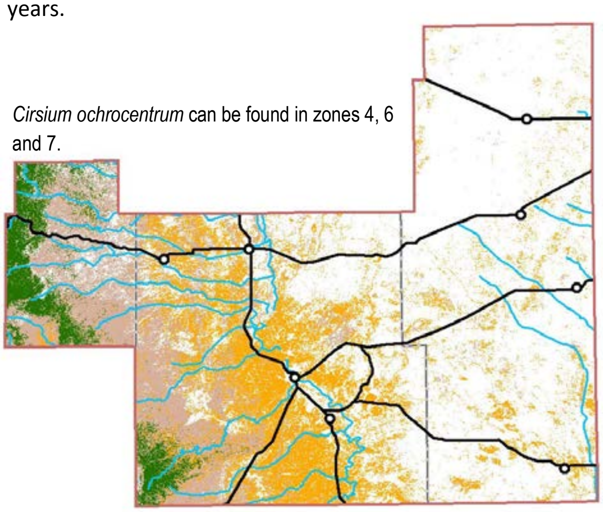
Habitat: Disturbed places, fields.

Similar Species: ***Cirsium texanum*** is similar to *C. ochrocentrum*, but the flower heads less than 25 mm long and the plant smaller overall. ***Cirsium undulatum*** is also similar to *C. ochrocentrum*, but the spines are much smaller, always less than 5 mm long, compared to 5–20 mm long.

Food: The seed were threshed, winnowed, ground and the flour was used to make bread (Castetter and Opler 1936). All parts of thistles are edible: greens, roots, stems, and flowers. Fresh leaves can be blended to make a juice, but be sure to strain out the spines! Leaves can also be cooked as greens (Elpel 2004). Young roots are edible raw; older roots become dry and tough but can be used to make tea or medicinal extracts. Young stalks can be skinned and chewed to obtain their juicy pith. Flowers can be pulled from the spiny receptacle and chewed like chewing gum.

Medicine: Although no documentation was found for SE NM ethnobotanical use, this plant has been used as a diuretic by other Native people (Swank 1932). The roots and seeds of thistles have been used to support liver function.

Storage: Seeds and dried plant could be stored for several years.



Cirsium ochrocentrum can be found in zones 4, 6 and 7.

Yellowspine Thistle –flower

Yellowspine Thistle –leaves

Yellowspine Thistle –flower

Yellowspine Thistle –flower

Archaeology: *Cirsium* has not been found in the archaeological record in the CFO district.

Fetid Marigold

Fetid Marigold –leaf

Fetid Marigold –leaf & flower

Fetid Marigold –flower

Dyssodia papposa (Vent.) Hitchc. (DYPA)
Fetid Marigold

A small, strongly lemon-scented plant with divided leaves and small yellow flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x							
Leaves					x	x	x	x	x	x	x	

Botanical Description: Annual 10–40 cm tall. Leaves 2–3 cm long, divided into 11–15 narrow linear leaflets. Flowers one to few in dense groups, flower 4–10 mm diameter, bell-shaped, rays 8 or fewer, disk flowers 25–30. Flower petals yellow on the inside, maroon on the outside. Fruit 3–3.5 mm long, hairy, with bristles.

Similar Species: ***Pectis angustifolia*—**lemonweed**,** is another strongly-scented, low-growing Asteraceae. It has long linear leaves and bunches of small bright yellow flowers.

Phenology: Flowers late spring.

Habitat: Roadside, disturbed fields.

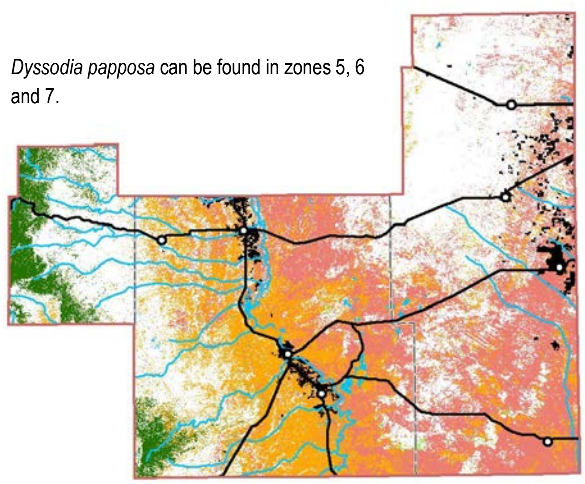
Food: Seeds winnowed, ground into flour, stored and used to make bread. Seeds were also roasted without grinding and combined with other foods. Tops of the plant were cooked alone or with meat and used as greens (Castetter and Opler 1936). Widely used for tea (Tull 2013).

Medicine: This plant was used by Native people living outside SE NM for headache, fever, ant bites, difficulty in breathing, epileptic fits, and spitting up blood (Swank 1932; Vestal 1952).

Veterinary: Given to horses for cough (Gilmore 1919).

Storage: Seeds and dried plant could be stored for several years.

Archaeology: *Dyssodia* has not been found in the archaeological record in the CFO district.



Dyssodia papposa can be found in zones 5, 6 and 7.

Flourensia cernua DC. (FLCE)
Tarbush, American Tarwort

A characteristic Chihuahuan desert shrub, thicker and bushier than creosote bush.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x	x	x	x	

Botanical Description: Shrubs about 1 m tall, stems very branched. Leaves alternate, thin oval, 10–25 mm long by 4–15 mm wide, smelling like tar or hops when crushed. Flower heads without petals, yellow flower heads composed of 10–25 florets.

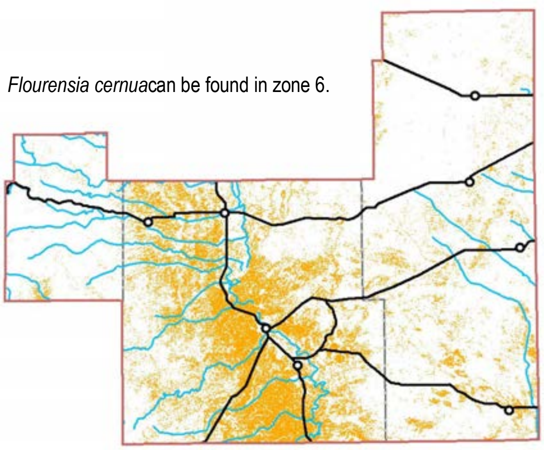
Phenology: Flowers (July earliest) September–November.

Habitat: Chihuahuan Mixed Desert Thornscrub, especially limestone, alkaline, or clay soils and gravelly areas. Much more common west of the Pecos River.

Medicine: Indigestion/Diarrhea—Outside of the CFO area it has been documented as a medicine sold in markets in Mexico and the United States (Mata et al. 2003, Tellez et al. 2003).

Storage: Dried leaves could be stored for several years.

Archaeology: *Flourensia* wood and a seed have been found once in the CFO region, from one undated site. It was probably of minor importance, archaeologically.




Tarbush—Single floret


Tarbush


Tarbush –flowers


Tarbush –leaves and flower


Tarbush –cross-section of flower

Snakeweed

Snakeweed

People who suffer from fibromyalgia may find relief from their pain using snakeweed. Soaking in a bath of snakeweed before bed is recommended to relax the body and give a deeper night's sleep (Kane 2009).

Snakeweed –flower

Snakeweed –flowers

Snakeweed –leaf

*Gutierrezia sarothrae (*Pursh) Britton & Rusby (GUSA2)
Broom Snakeweed

Small subshrub with dark green, linear leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x	x	x	
Stem						x	x	x	x	x	x	x

Botanical Description: Subshrubs 10–60 cm tall, stems sprawling or upright, with tiny hairs. Leaves alternate, sometimes in clusters, linear to lance-shaped, 1.5–2 mm wide, sometimes gummy. Flower heads in dense, flat-topped arrays. Flower heads 1.5–2 mm diameter. Petals 3–8, yellow, 3–5.5 mm long. Fruit 0.9–1.6 mm long, tan, hairy, with finely toothed scales.

Phenology: Flowers May–November.

Habitat: Grasslands, common on rocky, open slopes, and disturbed places; common in all habitats except deep sand.

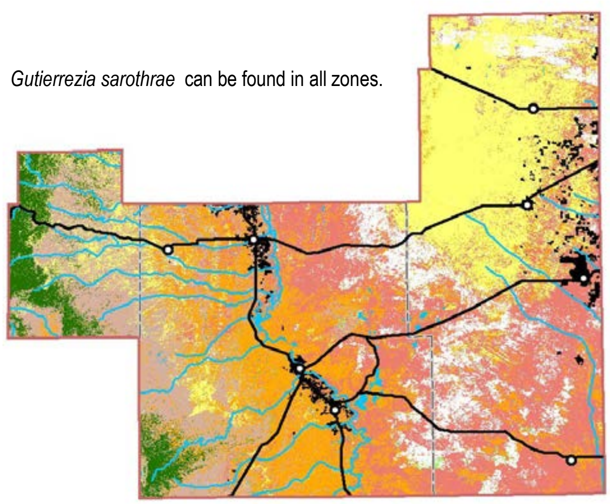
Similar Species: Prairie broomweed, ***Amphiachyris dracunculoides***, is a related species that grows erect in grasslands in eastern New Mexico and into Texas.

Medicine: Snakeweed is used as an antimicrobial and when applied to cuts and scrapes can help to heal the wound faster by retarding bacterial growth (Kane 2009). Snakeweed is considered an anti-inflammatory and a sedative to muscular-skeletal pain. Snakeweed is used externally for rheumatoid arthritis and to reduce joint soreness (Kane 2009). A liniment, salve or even the oils can be applied to painful areas.

Storage: The dried plant could be stored for several years.

Archaeology: This taxon has not been found in archaeological specimens the CFO, but due it its wide distribution has the potential to be found.

Gutierrezia sarothrae can be found in all zones.



Helenium microcephalum DC. (HEMI)
Littlehead Tarweed,
Smallhead Sneezeweed

Large "cone-flower" with 3-clawed yellow petals.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				

Botanical Description: Annuals, 25–120 cm tall, stems branched, winged. Leaves narrowly oblong, usually serrate, sometimes deeply toothed, usually smooth or sparsely hairy. Flower heads 20–300 per plant, on branching stalks 1–3 cm long. Flower heads 4–12 mm by 4–12 mm. Petals at the base of rounded disk, 7–13 mm in diameter, yellow (sometimes with reddish bases), 2–5 mm long. Disk is reddish brown.

Phenology: Flowers summer.

Habitat: Floodplains, wet playas, wetlands, uncommon.

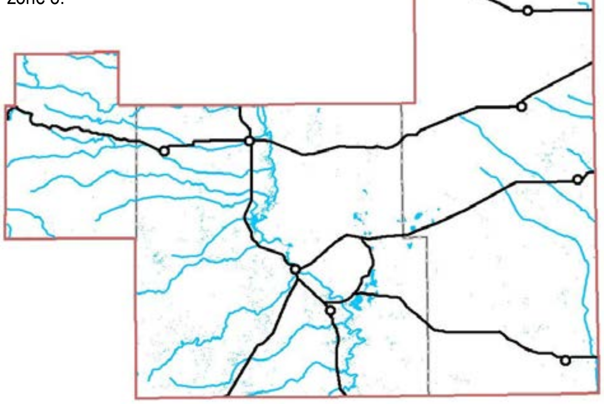
Similar Species: ***Ratibida columnifera*** and ***R. tagetes*** also have cone-flower centers, but *R. columnifera* has a cone that is much longer than wide, and *R. tagetes* usually has smaller petals with red bases. Also, both *Ratibida* species have divided leaves with linear thread-like lobes.

Medicine: The crushed blossoms have been used as an inhalant for hay fever (Elpel 2004). This plant is toxic to livestock (Tull 2013).

Storage: The dried plant could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Helenium microcephalum can be found in zone 8.



Littlehead Tarweed

Littlehead Tarweed

Littlehead Tarweed –flower heads

Annual Sunflower

The Navajo made a salve from pulverized seed and root and used on injuries sustained from a horse falling on a person (Vestal 1952).

Annual Sunflower

Annual Sunflower–leaves

Helianthus annuus L. (HEAN3) Annual Sunflower, Mirasol, Girasol

Common. Phyllaries ovate, abruptly narrowed to acuminate tip, ciliate.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x	x			
Seed									x	x	x	

Botanical Description: Robust annual 1–3 m tall, stems erect with rough hairs. Leaves opposite below, alternate above on short branches 2–20 cm long. Leaves 10–40 cm long, bases can be heart-shaped with serrate edges, the undersides rough-hairy. Flower heads on short stalks 2–20 cm long. Flower heads (excluding petals) 1.5–4 cm (but sometimes up to 20 cm) wide. Petals 17–30, yellow, surrounding reddish brownish or black center. Fruit dry seed 3–15 mm long, somewhat compressed, with scales 2–3.5 mm long at the top.

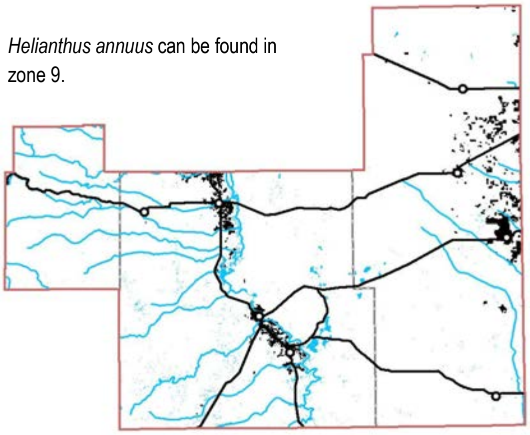
Phenology: Flowers summer–fall, seeds ripen in late summer and fall.

Habitat: Open areas, riverbanks, ditches, etc., especially moist clay soils.

Similar Species: Larger-seeded varieties have resulted from domestication, which occurred at least 4,000 years ago, possibly in both Eastern North America and Mexico.

Food: Seeds were parched by placing hot coals on a tray with seeds, shaking the tray to repeatedly expose seeds to high temperatures. Once parched, they were much easier to grind using a mano and metate (Gifford 1936). Seeds were then ground, sifted, made into dough, and baked on hot stones (Moerman 1998). Seeds were ground into flour and used to make a thick gravy (Castetter and Opler 1936). Seeds were mixed with corn and ground into a meal which was made into cakes (Castetter 1935). Apache have a rich record of sunflower use, including ownership of particular wild patches (Buskirk 1986; Reagan 1928).

Medicine: The whole plant has been applied to snakebites (Reagan 1929), to treat diminished thirst (Vestal and Schultes 1939), for pulmonary trouble (Gilmore 1919),



Annual Sunflower –stem

fatigue (Blankenship 1905), worms (Curtin 1949), and many other illnesses. Lipan Apache burned the stalk pith over parts of the body affected by rheumatism (Opler 1935).

Storeage: The dried seeds could be stored for several years

Archaeology: *Helianthus* has been found once in the CFO district from one site in the Early Formative. It was most likely a common food plant, but archaeologically difficult to identify from carbonized remains.

Sunflower blossoms were used to adorn or garnish other dishes (Castetter and Opler 1936). Sunflower flowers were used as a symbol of the powerful influence of the sun, constituting a prayer that the sun would continue to make the yield plentiful year after year (Castetter and Opler 1936).

Annual Sunflower –flower bud

Annual Sunflower –flower

Annual Sunflower –phyllaries abruptly narrow

Annual Sunflower –Achene: Steve Hurst


Texas Blueweed

This species is listed as a noxious weed in some Western states.


Texas Blueweed –flower


Texas Blueweed –flower


Texas Blueweed –

Helianthus ciliaris DC. (HECI)
Texas Blueweed

The smallest sunflower, blue-green, short, forming extensive colonies from perennial roots.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x	x		

Botanical Description: Perennials 40–70 cm tall from creeping roots, often forming extensive colonies. Stem ascending, smooth. Leaves mostly opposite, sessile, bluish-green, linear to lance-shaped, 3–7.5 cm long by 0.5–2.2 cm wide. Flower heads 1–5, on 3–13 cm long branches. Flower heads 12–25 mm diameter, 10–18 petals, 8–9 mm, yellowish around reddish brown center. Fruit a dry seed about 3 mm diameter, with scales 2mm long.

Phenology: Flowers summer–fall.

Habitat: Roadsides, ditches, cultivated fields, weedy.

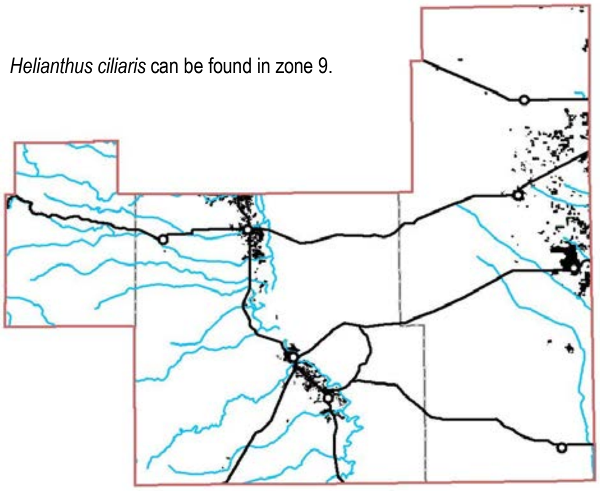
Similar Species: ***Ratibida columnifera*** and ***R. tagetes*** are cone-flowers inhabiting similar habitats. *R. columnifera* has a cone that is much longer than wide, whereas *R. tagetes* has a cone wider than long and usually has smaller petals with red bases. Also, both *Ratibida* species have divided leaves with linear thread-like lobes. The color and overall growth form of *R. tagetes* can be similar to *Helianthus ciliaris*, but the latter has opposite unforked leaves, whereas *Ratibida* has alternate divided leaves.

No recorded uses, but was probably used similar to *Helianthus annuus*.

Storage: Seeds could be stored for several years.

Archaeology: See *Helianthus annuus.*

Helianthus ciliaris can be found in zone 9.



Helianthus neglectus Heiser (HENE)
Neglected Sunflower

Usually branched, with a white "eye" in flower center. Lower leaves with cordate bases. Larger heads than *H. petiolaris*.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x			
Seed									x	x	x	

Botanical Description: Annuals 80–200 cm tall, no rhizomes. Leaves on branches 7–12 cm long, triangular to oval-shaped, 7–14 cm by 7.5–12.3 cm. Flower heads 1–5 on stalks 10–40 cm long. Flower heads (excluding petals) 10–14 mm diameter. Petals 21–31, 29–39 mm long, yellow. The green bracts on the back of the flower head (phyllaries) are lance-shaped (gradually tapering to the tip) and not ciliate.

Phenology: Flowers summer–fall.

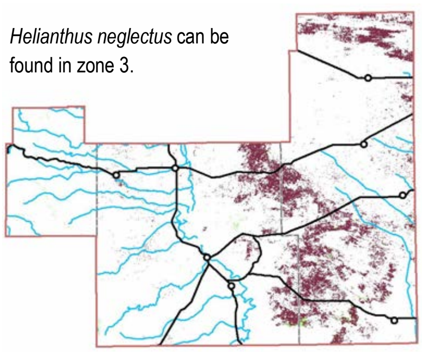
Habitat: Sandy soils, sand dunes.

No recorded uses, but was probably used similar to ***Helianthus annuus***.

Storage: Seeds could be stored for several years

Archaeology: See *Helianthus annuus.*

Helianthus neglectus can be found in zone 3.



Neglected Sunflower

Neglected Sunflower –leaves

Neglected Sunflower –developing fruit

Neglected Sunflower –flower

Prairie Sunflower

Prairie Sunflower -phyllaries gradually taper to the tip

Prairie Sunflower –leaves

Helianthus petiolaris Nutt. **(HEPE)**
Prairie Sunflower
Nańdile **(Mescalero Apache)**

Phyllaries lanceolate, gradually tapering to the tip, not ciliate. Usually branched, with a white "eye" in flower center.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x	x	x	x	
Leaves									x	x	x	
Seed									x	x	x	

Botanical Description: Robust annual 40–200 cm tall, stems hairy, no rhizomes. Leaves mostly alternate on short branches 2–4 cm long. Leaves 4–15 cm long by 1–8 cm wide, somewhat serrate. Flower heads 1–5 on short stalks 4–15 cm long. Flower heads (excluding petals) 10–24 mm diameter, with 10–30 yellow petals, each 15–20 mm long, with a red or brown center.

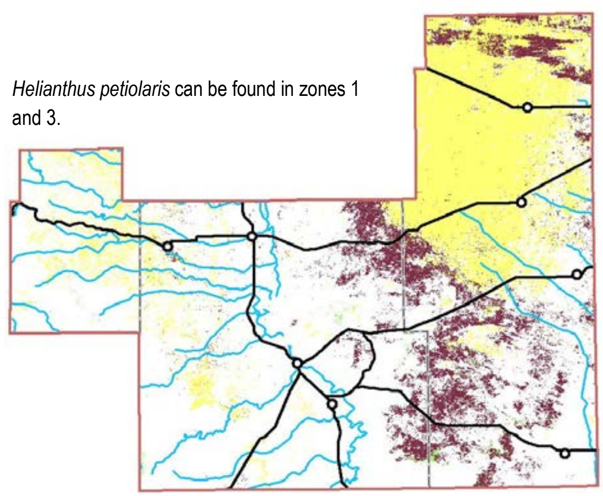
Phenology: Flowers summer–fall.

Habitat: Usually dry, sandy soils, roadsides.

No recorded uses, but was probably used similar to ***Helianthus annuus***.

Storage: Dried plant and seeds could b e stored for several years.

Archaeology: This taxon has not been found in the CFO region.



Helianthus petiolaris can be found in zones 1 and 3.

Laennecia coulteri (A. Gray) G.L. Nesom (LACO13)
Coulter's Horseweed

A weedy herb with sticky leaves and inconspicuous flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x	x	x	x	

Botanical Description: Annuals, 10–150 cm tall, often branched above but arising from a single stem. Leaves clasping, hairy, 2–5 cm long by 1–2 cm wide, sometimes toothed. Flower heads, small, barely opening, in spikes at top of plant. Seedheads like small dandelion tufts, showier than the flowers.

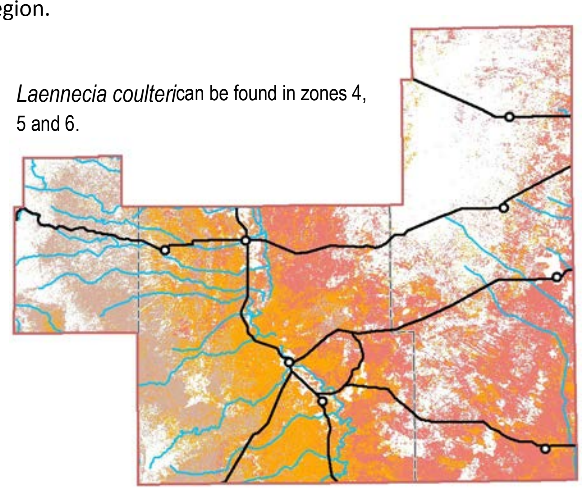
Phenology: Grows during monsoons, flowering late summer to fall.

Habitat: Disturbed areas, forming large colonies in wet years. Mesquite Upland Scrub. Chihuahuan Semi-Desert Grassland.

No recorded uses. May be toxic to livestock.

Storage: Dried plant could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.




Coulter's horseweed


Coulter's horseweed


Coulter's horseweed—leaves


Coulter's horseweed—flowers


Coulter's horseweed—seeds

Dotted Gayfeather

Liatris punctata Hook. (LIPU)
Dotted Gayfeather

A short plant with purple flowers on spikes.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x				
Root	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: 15–85 cm high. Leaves linear 5–14 cm long by 1–7 mm wide. Flower heads in spikes at the ends of the stems, purple-pink.

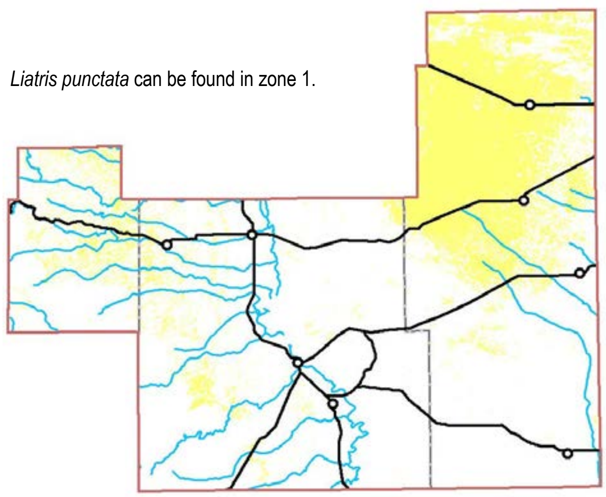
Phenology: Flowers late summer.

Habitat: Great Plains Shortgrass Prairie.

Medicine: Astringent and diuretic. The roots have been burned and the smoke inhaled for headaches, nosebleeds, sore throat, and tonsil inflammation. A tea of the root is similarly used for sore throat (Elpel 2004).

Storage: Dried plant could be stored for several years.

Archaeology: *Liatris punctata* has not been found in the archaeological record in the CFO district.



Liatris punctata can be found in zone 1.

Dotted Gayfeather –flower

Dotted Gayfeather -leaves

Melampodium leucanthum Torr. & A. Gray (MELE2)
Plains Blackfoot

A low daisy-like plant (flowers with a yellow center and white rays).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x	x		

Botanical Description: Perennial subshrubs, 12–40 cm tall. Leaves opposite, linear to lance-shaped, 20–35 mm long by 1–10 mm wide, with 1–6 lobes. Flower heads on branches 3–7 cm long, petals 8–13, cream-white, sometime stained purple on their backs, 25–50 yellow center florets. Fruits 1.5–2.6 mm.

Phenology: Flowers March–October.

Habitat: Desert grassland, bare hills.

Similar Species: This daisy is often confused with ***Zinnia acerosa***, the white Zinnia, but that usually has only 4–6 petals and narrower leaves.

No recorded uses: May have been used similarly to *Zinnia* species.**.**

Storage: Dried plant could be stored for several years.

Archaeology: *Melampodium* has not been found in the archaeological record in the CFO district.

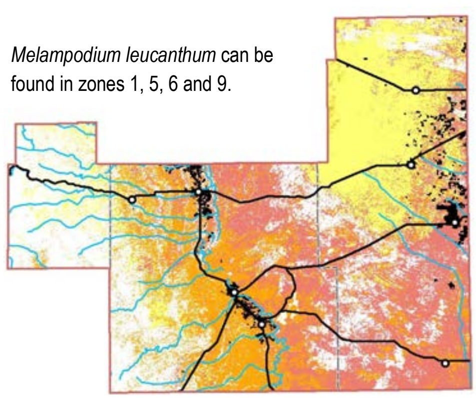
Plains Blackfoot is currently being researched for its efficacy against prostate and cervical cancer. Even though no ethnographically documented uses of a plant may be found, the plants of the CFO region may still have enormous and important medicinal properties that can be utilized.

Plains Blackfoot

Plains Blackfoot –flowers

Plains Blackfoot –flower

Plains Blackfoot –receptacle



Melampodium leucanthum can be found in zones 1, 5, 6 and 9.

Gray's Feverfew

Gray's Feverfew –flowers

Gray's Feverfew –seed

Parthenium confertum A. Gray (PACO11)
Gray's Feverfew
Gaxe (Mescalero Apache)

White-flowered forb with gray-green leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x	x		
Leaves				x	x	x	x	x	x	x		

Botanical Description: Biennials, 10–30 cm tall. Leaves 3–8 cm long by 1–2 cm wide, usually lobed, with hairs 1–2 mm long, gland-dotted. Flower heads in bunch on short branched stalks. Petals 5, 0.1–0.5 mm long.

Phenology: Flowers March–October.

Habitat: Openings in Chihuahuan Desert Scrub, on limestone soils, and Mesquite Scrub.

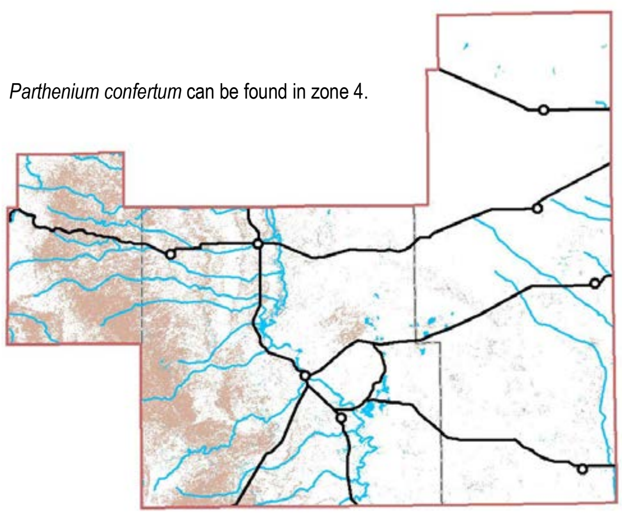
Similar Species: *Parthenium incanum* is larger overall and shrubby, and grows in similar habitats. It produces about 2%–3% rubber sap. Many people are allergic to the sap.

Beverage: (Apache, Chiricahua and Mescalero) Fresh leaves of both species of *Parthenium incanum* were boiled and used similarly to coffee (Castetter and Opler 1936).

This is an extremely bitter beverage, even if very few leaves are used. This makes it a good liver tonic. In the CFO area, *P. incanum* is found in regular close proximity to documented Apache cultural use sites of importance (ie, Sitting Bull Falls, Boyd's Cave, Seven Rivers Hills, and others), sometimes in greater densities than the surrounding terrain. It may be a cultural use marker plant but more research needs to be done on this. Gray's Feverfew is not found at these sites as often, if at all; if the cultural use theory holds, *P. incanum* appears to be favored over Gray's Feverfew at sites found in the CFO region.

Storage: Dried plant could be stored for several years.

Archaeology: *Parthenium* has not been found in the archaeological record in the CFO district.



Parthenium confertum can be found in zone 4.

Psilostrophe tagetina (Nutt.) Woolly Paperflower Greene (PSTA)

Yellow flowers, grayish leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x	x	x	x	x		
Leaves				x	x	x	x	x	x	x		

Botanical Description: Biennials or perennials, 10–30 cm tall, stems gray-green, fuzzy. Flower heads in arrays on 12–20 mm stalks. Petals 3–4, 7–14 mm long, yellow, toothed.

Phenology: Flowers April–October.

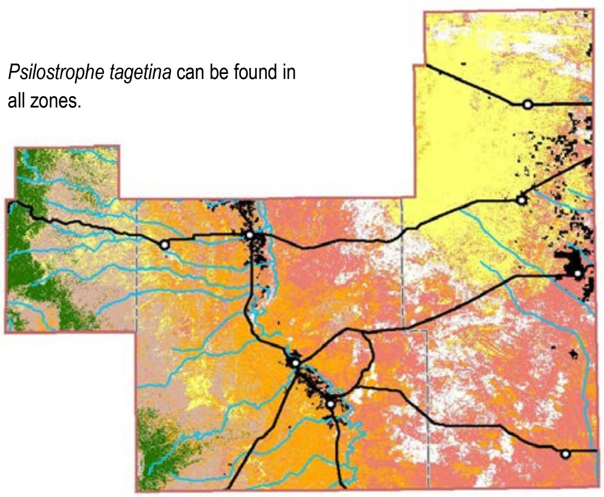
Habitat: Chihuahuan Desert Scrub, Great Plains Shortgrass Prairie, limestone soils, saline flats, and sandy soils; widespread.

No recorded uses.

Storage: Dried plant could be stored for several years.

Archaeology: *Psilostrophe* has not been found in the archaeological record in the CFO district.

Psilostrophe tagetina can be found in all zones.



Woolly Paperflower

Woolly Paperflower

Woolly Paperflower –flower

Woolly Paperflower –flower

Woolly Paperflower –flower

Threadleaf Ragwort

Threadleaf Ragwort –flower

Threadleaf Ragwort –seeds

Senecio flaccidus Less. (SEFL3)

Threadleaf Ragwort, Groundsel

A shrub-like plant with grayish green, linear “floppy” leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x	x	x	
Leaves				x	x	x	x	x	x	x	x	x

Botanical Description: Herbaceous shrub 40–120 cm tall, leaves gray–hairy. Usually with multiple stems, leaves linear 3–10 cm long by 1–5 mm wide. Flowers 3–10 in bunches. Ray flowers 10–15 mm long. Seeds narrow with long bristles at the top.

Phenology: Flowers mid-summer to fall, but also occasionally in the spring.

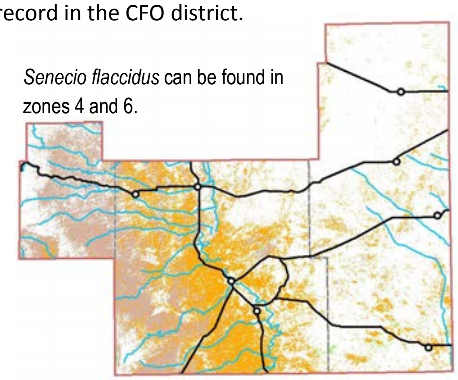
Habitat: Sandy or rocky open sites in Chihuahuan Desert Scrub and Great Plains Shortgrass Prairie. Widespread.

Similar Species: ***Senecio riddellii*** looks similar but has green smooth leaves (not hairy), more flowers, and the ray petals are shorter than *S. flaccidus*.

Medicine: Groundsels are diuretic, astringent, and diaphoretic, but in larger quantities they may induce vomiting or diarrhea (Elpel 2004). Incensing with the smoke from burning sage or "ghost medicine" (*Senecio filifolius*, Nutt.) [Synonym for *Senecio flaccidus* var. *flaccidus*] is another prophylactic against ghosts, one inevitably employed by the members of a newly-bereaved family. Said a Mescalero in explanation of its benefits: "If any member of your family dies you burn 'ghost medicine' and put all the members of the family through the smoke. If nobody in your family died but you handled a body, you do it for yourself anyway. You do this so the ghost won't cause evil influence over you. It's just made for that purpose. I don't know just how it prevents the ghost from harming you, but it is recognized that it does. It's the odor that keeps the ghost away. When people are out of their senses from ghost sickness this is burned and they inhale the smoke. The smoke scares the ghost away, too. This plant can be boiled, and a tea made from it can be drunk also" (Opler 1946, pg 457). The smudge from this plant is distinctly “sage-like” with a slightly acrid edge to it. Since several sources report on the toxicity of the plant to livestock, caution should be used when making the documented tea or using the smudge in a confined space without ventilation.

Storage: Dried plant could be stored for several years.

Archaeology: *Senecio* has not been found in the archaeological record in the CFO district.



Thelesperma megapotamicum (Spreng.) Hopi Tea Greenthread, Navajo Tea, Cota Kuntze (THME)
Tł ʽu gaxéé ʽ (Mescalero Apache)

Tall forb with shiny green stems, sometimes with a whitish coating that rubs off.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x	x	x	x	x		
Stem							x	x	x	x	x	x

Botanical Description: Perennials, 30–80 cm tall, with slender, weak stems. Leaves linear, opposite, scattered along smooth gray-green stem. Flower heads yellow, on long stalks, with no petals.

Phenology: Flowers April–October.

Habitat: Disturbed areas, along desert washes, Mesquite Scrub. Widespread.

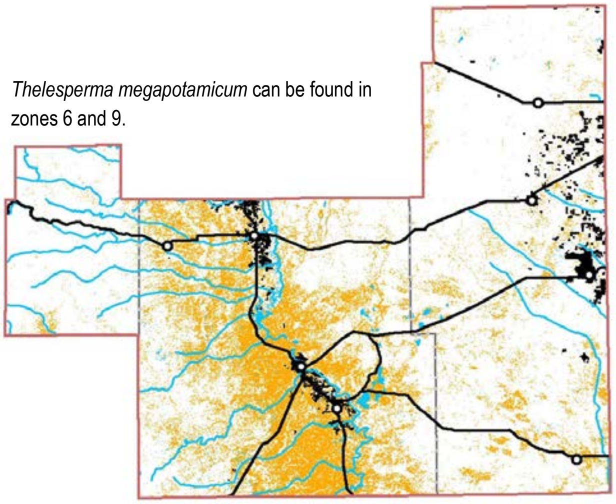
Beverage: Leaves and young stems were boiled to make a tasty tea, which was drunk fresh or stored for later (Castetter and Opler 1936). One 30-cm section of stem with leaves makes one good cup of tea (Tull 2013).

Medicine: Hopi greenthread was used for children with tuberculosis (Swank 1932), as a nerve stimulant, and for toothaches (Elmore 1944).

Storage: Dried plant could be stored for several years.

Archaeology: *Thelesperma* has not been found in the archaeological record in the CFO district.

Thelesperma megapotamicum can be found in zones 6 and 9.



Hopi Tea Greenthread –flower

Hopi Tea Greenthread

Hopi Tea Greenthread –flower

Hopi Tea Greenthread –flower

Hopi Tea Greenthread –seedhead

Prickly Leaf Dogweed

Thymophylla acerosa (DC.) Strother (THAC)
Prickly Leaf Dogweed
Tsį 'sdząné bizą̨ą̨yé (Mescalero Apache)

Dead stems and dried leaves often give a scruffy appearance.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x	x	x	
Leaves				x	x	x	x	x	x	x	x	

Botanical Description: Subshrubs to 25 cm tall, green. Leaves mostly opposite, linear, 10–18 mm long, with translucent oil glands. Flower heads solitary on each stem, petals 7–8, lemon-yellow, 5–6 mm long.

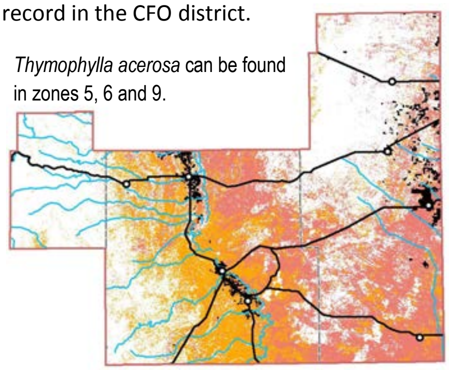
Phenology: Flowers throughout year, mostly summer–fall.

Habitat: Calcareous outcrops and gypsum soils.

Medicine: (Apache, Mescalero; Isleta) can be used in a bath for fever relief or mixed with tobacco and smoked (Conway n.d.). The Mescalero Apache name for Prickleleaf Dogweed means "small woman wood."

Storage: Dried plant could be stored for several years.

Archaeology: *Thymophylla* has not been found in the archaeological record in the CFO district.



Prickly Leaf Dogweed –stems and leaves

Prickly Leaf Dogweed –flower

Prickly Leaf Dogweed –flower

Verbesina encelioides (Cav.) Benth. & Hook. Golden Crownbeard, Cowpen Daisy f. ex A. Gray (VEEN)

Similar to sunflowers, but flower heads have yellow centers and petals are 3-clawed.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower								x	x	x		
Leaves				x	x	x	x	x	x	x		

Botanical Description: Annuals 10–50 cm tall with a stout taproot. Erect, much-branched, with appressed hairs. Leaves mostly alternate above, opposite below, ovate to triangular, 3–8 cm by 2–4 cm, edges may be coarsely toothed, densely hairy with coarse white hairs. Strong odor when crushed. Flower heads solitary, sometimes 2–3 in loose arrays. Flower heads (excluding petals) 1–2 cm diameter. Petals 12–15, 8–25 mm long, yellow, tips 3-lobed. Fruits egg-shaped, dry seeds, flattened, winged, tipped with two tapering awns.

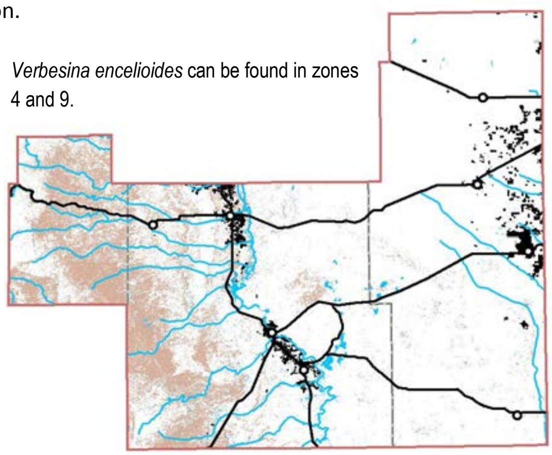
Phenology: Flowers August–October.

Habitat: Swales, disturbed sites, pastures.

Medicine: Used to treat skin problems and spider bites (Elpel 2004).

Storage: Dried plant could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.



Verbesina encelioides can be found in zones 4 and 9.

Golden Crownbeard –flower

Golden Crownbeard –flower & stem

Golden Crownbeard – seeds and leaf

Golden Crownbeard –flower with 3-clawed petals

Xanthium strumarium L. (XAST)
Cocklebur

Rough leaves and prickly seedheads.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x	x	x		
Leaves					x	x	x	x	x	x		
Root					x	x	x	x	x	x	x	x

Botanical Description: Annual forb to 80 cm tall. Leaves alternate, sandpapery, 5–15 cm wide and long, often 3-lobed with toothed margins. Small greenish flower heads develop into large burs (1–3 cm long) with hooked spines that easily catch in fur or clothing.

Phenology: Flowers July–October.

Habitat: Wet swales in warm desert washes, and roadsides.

Medicine: Leaves are diuretic, and the seeds are a more potent diuretic and astringent. A boiled tea of the seed pods has been used for diarrhea and arthritis (Elpel 2004).

Storage: Dried plant could be stored for several years.

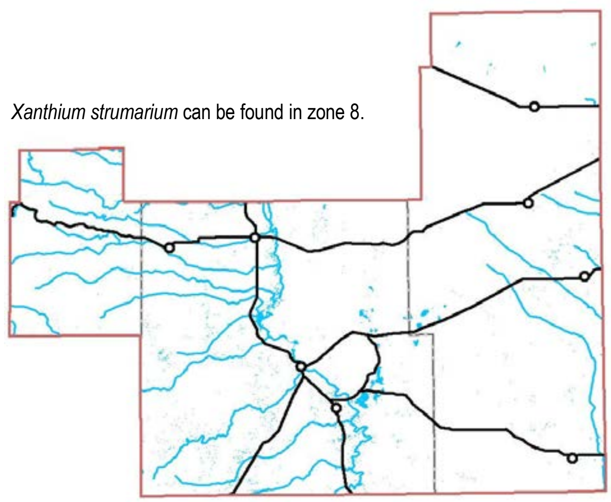
Archaeology: This taxon has not been found in the CFO region.

Cocklebur

Cocklebur–flower head

Cocklebur–burs

Cocklebur–seed



Xanthium strumarium can be found in zone 8.

Cocklebur–bur with exposed seed

Zinnia grandiflora Nutt. (ZIGR)
Rocky Mountain Zinnia

Yellow-flowered subshrub.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x	x	x		
Leaves				x	x	x	x	x	x	x	x	

Botanical Description: Subshrubs to 22 cm tall, rounded, much branched. Leaves linear 1–3 cm long by 2–3 mm wide. Flower heads on short stalks to 11 mm. Flower heads 5–8 mm by 5–8 mm. Petals 3–6, bright yellow.

Phenology: Flowers spring–fall.

Habitat: Rocky open slopes, flats, and calcareous soils.

Similar Species: ***Zinnia acerosa*** is similar but has white flowers. In our region, ***Melampodium leucanthum***, Plains blackfoot daisy, is more common. It is similar to *Z. acerosa* but has wider leaves and more than seven white petals around a yellow center.

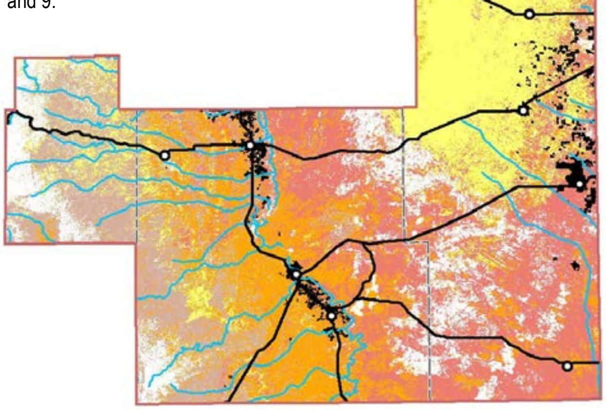
Medicine: (Keres) Hot infusion of plant drunk for kidney trouble, Infusion of plant used as a bath for excessive sweating (Swank 1932, pg. 38). (Navajo) Plant used for throat and nose troubles (Elmore 1944, pg. 97). (Navaho, Ramah) Decoction of plant taken for stomachache, heartburn and as a cathartic. Plant used as a ceremonial emetic (Vestal 1952, pg. 54). (Zuni) Smoke from powdered plant inhaled in sweatbath for fever, cold infusion of blossoms used as an eyewash (Stevenson 1915, pg. 45)

Dye: (Keres) Flowers ground with white clay or mixed with warm water, used as yellow dye for wool, flowers rubbed into buckskin as a yellow dye, flowers ground into a paste and used as a dark red body paint (Swank 1932, pg. 38).

Storage: Dried plant could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Zinnia grandiflora can be found in zones 1, 4, 5, 6, and 9.



Rocky Mountain Zinnia

Rocky Mountain Zinnia –flowers

Rocky Mountain Zinnia –flowers

Rocky Mountain Zinnia –individual floret

Red Barberry

Red Barberry –leaves & branch

The fruit can be crushed and mixed with water to prepare a refreshing drink or an excellent jelly.

Red Barberry –berries

Red Barberry –flower

Mahonia haematocarpa (=*Berberis haematocarpa*) (Woot.) Fedde (MAHA4)
Red Barberry, Algerita
Łí bidzee' (Mescalero Apache)

Spine-tipped holly-like leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower		x	x	x	x	x						
Fruit							x	x	x			
Root	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Evergreen shrubs with pointed leaves, 1–3 m tall. Bark grayish purple, smooth. No spines, but leaves have sharp points. Leaves composed of five to seven leaflets. Leaflets thick and rigid, dull gray-green, with two to four teeth tipped with spines. Flowers in small bundles, hanging, 5–7 flowered, 1.5–4.5 cm long. Fruits are purple-red berries, smooth, spherical, 5–8 mm diameter, juicy and solid. Seeds red berries, 3–4 mm long.

Phenology: Flowers February–June.

Habitat: Chihuahuan Desert Scrub, on rocky hillsides and foothills.

Similar Species: ***Mahonia trifoliolata*** is similar species growing farther east, with only three leaflets.

Dye: A yellow dye was made from yellow wood and root shavings (Basehart 1960).

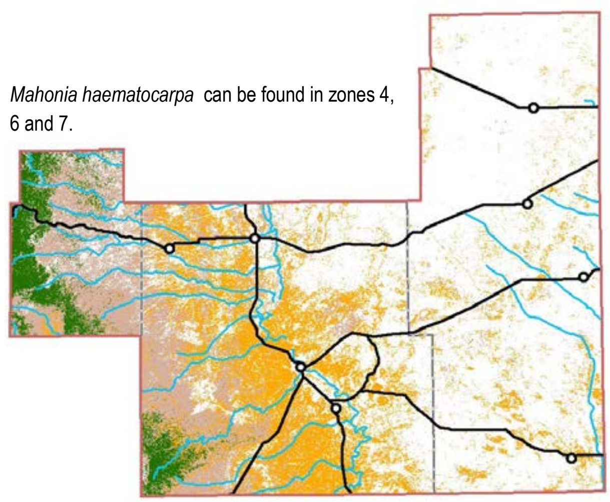
Food: Fruit was eaten fresh (Basehart 1960), or the fruit was cooked with a sweet substance, strained, and eaten as jelly (Castetter and Opler 1936). Lipan Apache ate cooked berries mixed with sotol or mescal (Opler 1935).

Medicine: Inner wood shavings were soaked in water, strained, and used as an eyewash (Basehart 1960) and as eye medicine (Moermon 2009).

Storage: Dried fruit could be stored for several years, wood if stored properly, indefinitely.

Archaeology: This taxon has not been found in the CFO region.

Mahonia haematocarpa can be found in zones 4, 6 and 7.



Chilopsis linearis (Cav.) Sweet, (CHLI2) Desert Willow

Thin linear leaves and large, showy, snapdragon-like flowers become bean pods.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x			
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Tree 2–9 m tall. Leaves are alternate, simple, linear, drooping, 10–18 cm long, 2–8 mm wide. Flowers are in spikes at the ends of branches, white, pink or lavender, tubular, almost like a snapdragon. Fruits are beanpod-like, with four angles, 13–32 cm long. Seeds are winged with hairs.

Phenology: Flowers March–September with adequate rain.

Habitat: Warm desert washes.

Medicine: In Mexico, a decoction of the flowers is used to treat coughs and other bronchial problems (Lady Bird Johnson Wildflower Center). Dried leaves and bark have antifungal properties and can be used as a first-aid poultice for open sores (Moore 1989).

Food: (Cahuilla) Blossoms and seed pods used for food (Bean and Saubel 1972, pg. 53)

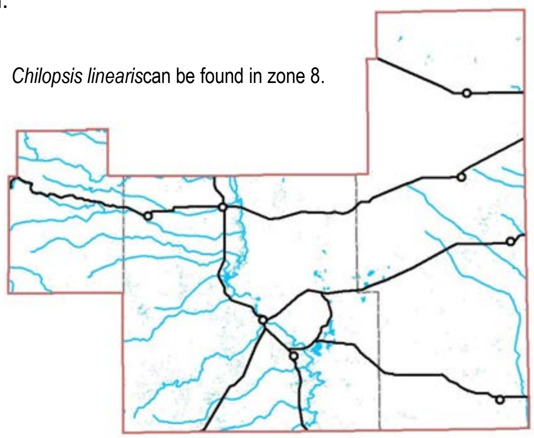
Wood: Probably also used for fuel and construction.

Storage: Dried seeds, leaves and barks could be stored for several years.

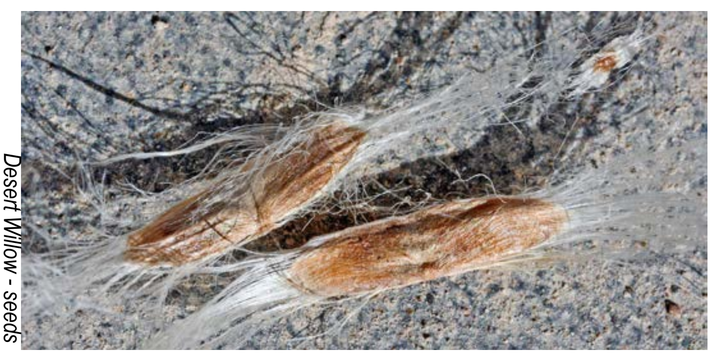
Archaeology: This taxon has not been found in the CFO region.

Desert Willow

Desert willow is not related to the true willows, such as coyote willow (*Salix exigua*).



Desert Willow - flower



Desert Willow - seeds

Desert Willow - leaf

Desert Willow - fruits

Cryptantha

Cryptantha cinerea (CRC13) (Greene) Cronquist

James' Cryptantha

A tiny spring annual with small white flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x								
Leaves				x	x	x	x	x	x	x	x	

Botanical Description: Small fuzzy green plants with small white flowers in coiled clusters (like scorpion weed), often forming a ground cover in the spring. There are at least seven species that occur in our area.

Phenology: Often blooming early in the spring.

Habitat: Disturbed areas; widespread.

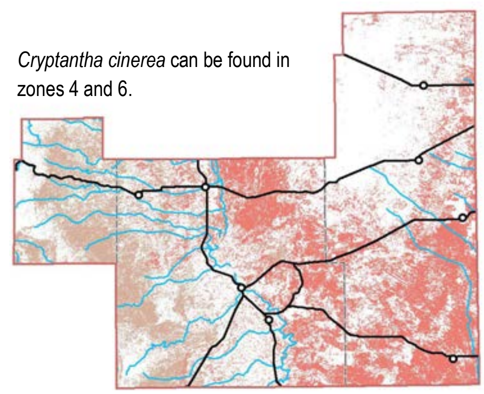
Medicine: (Navajo, Kayenta) Plant given to newborn infant for prenatal snake or toad infection , poultice of plant applied or plant used as lotion for snakebites, poultice of plant applied or plant used as lotion for livestock with snakebites (Wyman 1951, pg. 40). Root used as ceremonial medicine, poultice of root or powdered root applied to sores, cold infusion of root used as 'life medicine,' cold infusion of whole plant used for birth injury, (Vestal 1952, pg. 40). (Hopi) poultice of pounded plant applied for body pains. (Whiting 1939, pg. 32, 88). (Zuni) Powdered root used for a sore anus (Camazine and Bye 1980, pg 374).

Fodder: (Navajo, Ramah) Used for sheep feed (Vestal 1952, pg. 40).

Storage: Dried plant could be stored for several years.

Archaeology: This taxon was not found in the CFO region.

Cryptantha –flowers



Cryptantha –flowers

Cryptantha –flowers

Heliotropium convolvulaceum (HECO)
(Nutt.) A. Gray
Heliotrope

White corolla flowers, with simple leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x				
Seed								x	x	x	x	x

Botanical Description: Annual, leaves alternate, flowers white, 8–15 mm across, five united petals. Fruit of four 1-seeded nutlets.

Phenology: Flowers late summer.

Habitat: Sandy areas and dunes.

Similar species: ***Heliotropium greggii*** grows as a weed in roadside ditches and has smaller flowers and linear leaves.

Food: (Navajo, Kayenta) Seeds made into mush and used for food. (Wyman 1951, pg. 40).

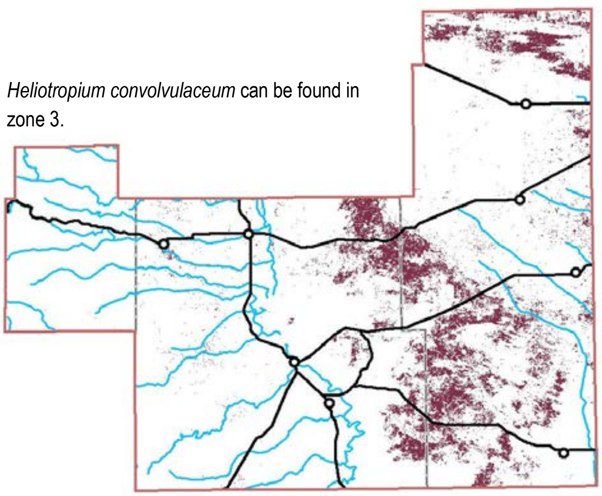
Storage: Seeds could be stored for several years.

Archaeology: This taxon was not found in the CFO region.

Heliotrope

Heliotrope –flower

Heliotrope –stem



Heliotropium convolvulaceum can be found in zone 3.

Heliotrope –leaf

Heliotrope –flower

Woody Crinklemat

Tiquilia canescens
(DC.) A.T. Richardson (TICA)
Woody Crinklemat

Prostrate, hairy, with small purple flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x	x	x	x			

Botanical Description: Subshrub usually less than 20 cm tall, taprooted, covered in felt hairs. Leaves are irregularly alternate and clustered, elliptic, less than 1 cm long, grayish with soft hairs. Individual flowers arise from leaf bases, 3–5 mm in diameter, 5 united petals, pinkish white. Fruit 1–4 nutlets, spherical, 4-grooved, each seed 2–2.5 mm long.

Phenology: Flowers April–September.

Habitat: A common grayish subshrub on rocky hillsides in Chihuahuan desert scrub. Prefers limestone-derived calcareous soils.

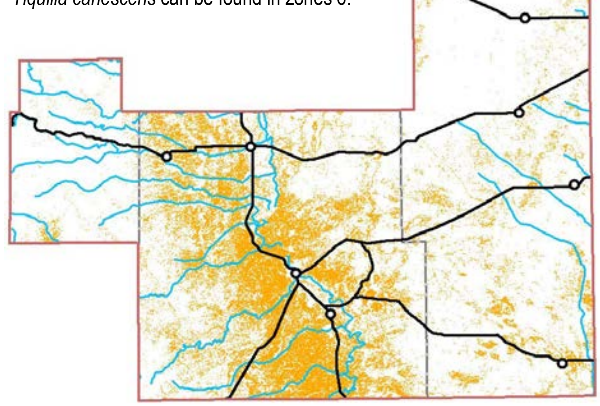
Similar Species: ***Tiquilia hispidissima*** is a similar subshrub but is confined to gypsum soils. Its leaves have tiny spines.

No recorded uses.

Storage: Dried plant could be stored for several years.

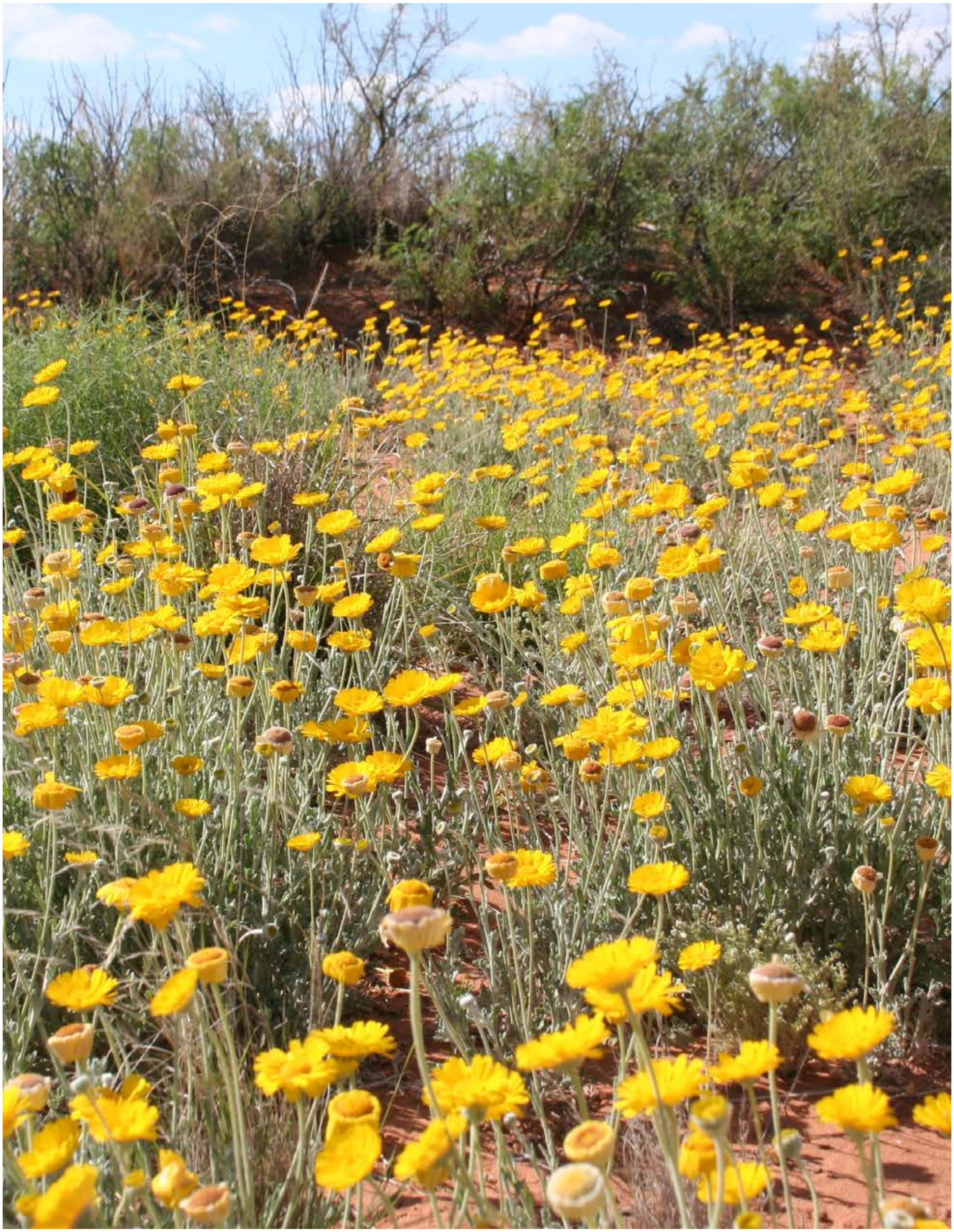
Archaeology: This taxon was not found in the CFO region.

Tiquilia canescens can be found in zones 6.



Woody Crinklemat

Woody Crinklemat –flower



Profusions of Asteraceae throughout the growing seasons are a common site in the CFO region.

Shepherd's Purse

Shepherd's Purse –flower

Capsella bursa-pastoris (L.) Medik. (CABU2) Shepherd's purse

The heart-shaped, purse-like seed pods are easily recognizable.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower	x	x	x	x	x	x	x	x	x	x		
Leaves			x	x	x							
Seed			x	x	x							

Botanical Description: Annual herb 10–60 cm tall. Stems are upright, slightly branched, covered with star-shaped hairs. Leaves in a basal rosette and along the stem; basal leaves stalked, 5–10 cm long, lobed, and hairy. Stem leaves alternate, stalkless, clasping, much smaller than basal eaves, lance-shaped to linear with a lobed base, sometimes toothed, hairy. Flowers occur in branched clusters at the end of the stems. Flowers 3–4 mm wide, 4-petals, white. Fruit is a pod on 1–2 cm long stalk, 4–8 mm long, heart-shaped, flattened.

Phenology: Flowers January–October.

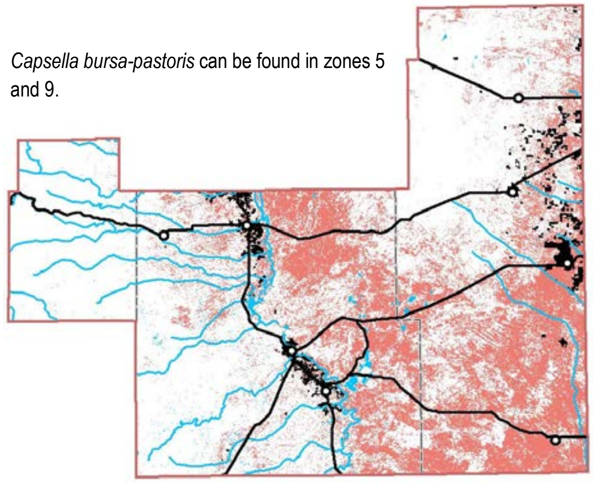
Habitat: Weedy, disturbed areas. Not native.

Food: Seeds winnowed, ground into flour, stored, and used to make bread. Alternately, seeds were roasted without grinding and combined with other foods as a seasoning (Moermon 1998). The green pods can be used as a peppery seasoning (Tull 2013).

Medicine: helps control excessive bleeding in menopausal and perimenopausal women and women who have excessive menstrual bleeding (Moore 1989, pg. 108). "Midwives dealing with postpartum hemorrage and menopausal women who bleed heavily praise the prompt effectiveness of dropperful doses (1ml)" [Susan Weed].

Storage: Dried seeds and leaves can be stored for several years.

Archaeology: Two seeds from a *Brassicaceae* family species have been found in two sites in the CFO region.



Capsella bursa-pastoris can be found in zones 5 and 9.

Descurainia sophia
(L.) Webb ex Prantl, (DESO2)
Herb Sophia

A common weed forming thickets along roadsides and fence lines.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x								
Leaves		x	x	x								
Seed				x	x							

Botanical Description: Annual or biennial with a thick taproot, without glands, sparsely to densely hairy. Stems erect, 2–7 cm. Leaves alternate, finely divided, up to 15 cm long. Flowers in a loose branched cluster at the top of the stem, 4-petaled, yellow cream, minute, 2–3 mm long. Fruits narrow linear pods, ascending, 15–27 mm long, less than 1 mm wide. Seeds in one row, in each of 2 chambers, 20–48 seeds per pod, reddish brown, oblong.

Phenology: Begins growing in early spring (February) and flowers March–April, with seeds appearing as leaves die back April–May.

Habitat: Roadsides, disturbed areas.

Similar Species: ***Descurainia pinnata*** is shorter overall and has shorter pods, hairy-glandular stems, and slightly less divided leaves. ***Sisymbrium irio*** (London rocket) is another spring-annual weedy mustard growing along roads and fence lines. It has deeply toothed leaves (not finely divided) and fewer, longer linear fruits.

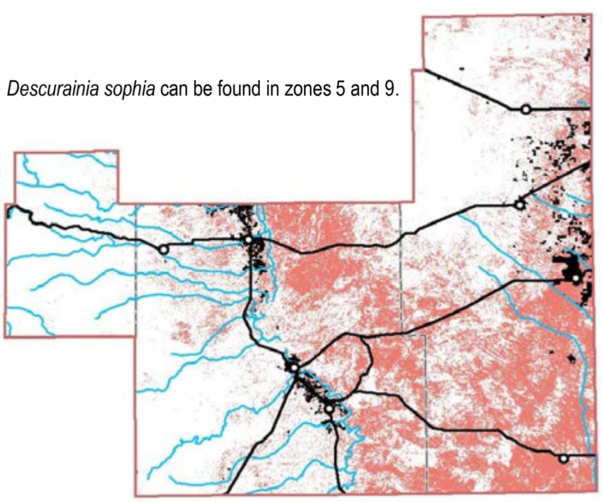
Food: Mustard greens are edible early in the season. Green seedpods are edible raw or pickled. Dried pods can be collected for the hard seeds. Mustard seeds can be ground to make mustard (Blair 2014).

Medicine: Leaves can be wrapped around bruises and other injuries to increase circulation and promote healing (Blair 2014).

Storage: Dried seeds and leaves can be stored for several years.

Archaeology: This taxon was not found in the CFO region.

Descurainia sophia can be found in zones 5 and 9.



Herb Sophia

Herb Sophia –flowers

Non-native:
Herb Sophia was introduced from Europe.

Herb Sophia –stem

Herb Sophia –leaf

Dimorphocarpa wislizeni (Engelm.) Rollins (DIWI2)
Spectacle Pod, Tourist Plant

Few, large white flowers become distinctive "spectacle"-shaped seed pods.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x				
Leaves				x	x	x	x	x	x	x	x	

Botanical Description: Stems 20–60 cm tall. Basal leaves 3–7 cm long, stem leaves smaller, linear. Flowers white or lavender, petals 3–4mm long by 1–1.5 mm wide, hairy on the undersides. Fruits 4.0–5.5 mm by 5–7 mm, often longer than wide. Seeds oval, 2–3 mm by 1.5–2 mm.

Phenology: Flowers March–August.

Habitat: Disturbed areas, roadsides, and Sandhill Shrubland, very common and very widely distributed.

Medicine: (Apache, White Mountain) Infusion of plant taken at medicine ceremonies, as wash for swellings, and for throat troubles. (Hopi) dried, powdered leaves sprinkled on abrasions, ground stalk used as a salve for all kinds of sores, pods ground and sprinkled on wounds. (Reagan 1929, Fewkes 1896, Vestal 1940, Colton 1974, Whiting 1939).

Storage: Dried leaves can be stored for several years.

Archaeology: This taxon was not found in the CFO region.

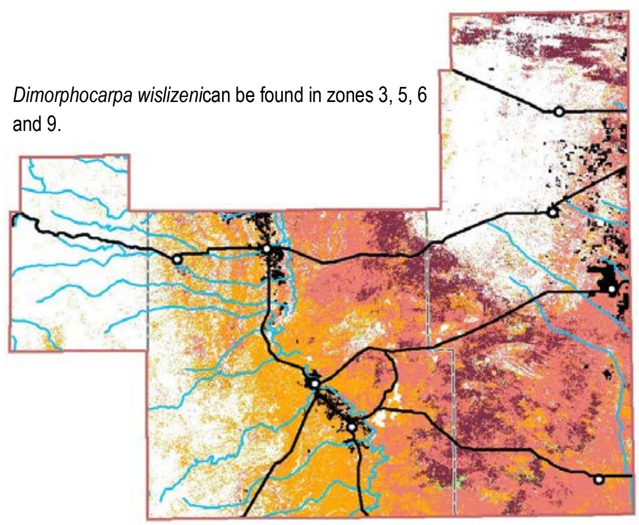
Tourist Plant –flowers

Tourist Plant –flower

Tourist Plant –basal leaves

Tourist Plant –stem & flower

*Dimorphocarpa wislizeni*can be found in zones 3, 5, 6 and 9.



Tourist Plant –fruit

Lepidium alyssoides A. Gray (LEAL4)
Pepperweed

A common bright-green bushy plant with showy white flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x	x					
Leaves			x	x	x							

Botanical Description: Perennial herb 10–50 cm tall. Several stems ascending from woody base. Basal leaves 10–80 mm long and 10–35 mm wide on long stalks. Upper leaves narrow and not stalked, 10–70 mm long and 1–2 mm wide. Flowers clustered, each with four white petals, 2–3 mm long. Fruits are short pods, 2–4 mm by 2–3 mm, thin and smooth. Seeds are ovals 1.5 mm by 1 mm. When in flower, the bright white petals and bright green herbage are visible from a distance.

Phenology: Flowers April–July.

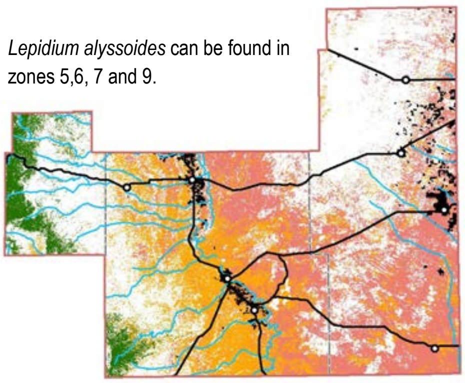
Habitat: Weedy areas, recently disturbed ground, Mesquite Scrub.

Similar Species: There are three species of *Lepidium* in the region. *L. virginicum* and *L. lasiocarpum* are both small annuals with small flowers (less than 1-mm petals) in shorter clusters than *L. alyssoides*.

Food: Pepperweed is edible raw or cooked. *Lepidium* is an important food for some tribes in Central and South America (Tull 2013). It has been used as a treatment for poison ivy (Elpel 2004). It has uses similar to those listed under *Descurainia* (Blair 2014).

Storage: Dried roots and leaves can be stored for several years.

Archaeology: This taxon was not found in the CFO region.




Pepperweed


Pepperweed


Pepperweed –flower

Bladderpod

Lesquerella fendleri
(A. Gray) S. Watson (LEFE)
Bladderpod

A common subshrub with yellow flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x							
Leaves			x	x	x	x	x	x				

Botanical Description: Short-lived perennial, much branched, usually less than 15 cm tall. Leaves are grayish green with hairs, alternate and crowded, less than 2 cm long. Flowers 4-petaled, yellow, in crowded clusters. Fruit pod inflated, oval, 2–3 mm diameter.

Phenology: Flowers April–May

Habitat: Widespread on limestone and gypsum soils and anywhere rocky in Chihuahuan Desert Scrub.

Similar Species: This plant has also been called *Physaria fendleri*.

Uses: Leaves and green seed pods can be used to add a peppery spice to food (Tull 2013).

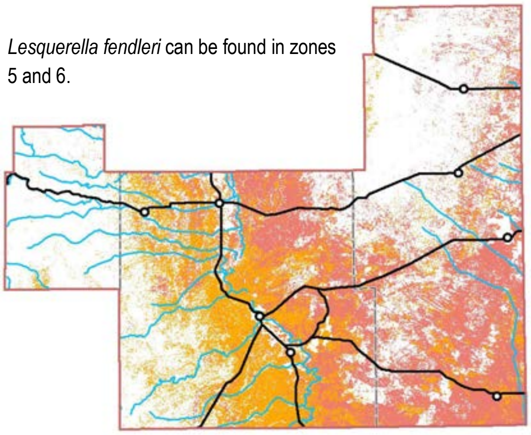
Storage: Dried seeds and leaves can be stored for several years.

Archaeology: This taxon was not found in the CFO region.

Bladderpod –leaves & flower

Note: There are interesting hairs with "webbing" on the leaves (use a hand lens).

Interesting fact: *L. fendleri* is now cultivated as an oil crop to replace castor oil in some applications.



Lesquerella fendleri can be found in zones 5 and 6.

Bladderpod –flower

Bladderpod—seeds

Cylindropuntia imbricata (Haw.) F.M. Knuth, (CYIM2)
Tree Cholla
Xush disht'uud í (Mescalero Apache)

An erect cactus with muscular jointed stems.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x						
Fruit				x	x							
Leaves				x	x							
Root				x	x							

Botanical Description: Large shrub, 150–250 cm tall, grayish green, segments cylindrical. Spines 8–15 per areole, or nearly spineless, 8–30 mm long. Glochids (small barbed spines) present. Flowers dark pink to magenta, 15–35 mm diameter. Fruits yellow, 20–40 mm in diameter, fleshy, spineless. Seeds yellow, 2.5–4 mm diameter, lumpy.

Phenology: Flowers May–June.

Habitat: Scattered locations, grasslands including Great Plains Shortgrass Prairie, Chihuahuan Semi-Desert Grassland, as well as Chihuahuan Desert Scrub.

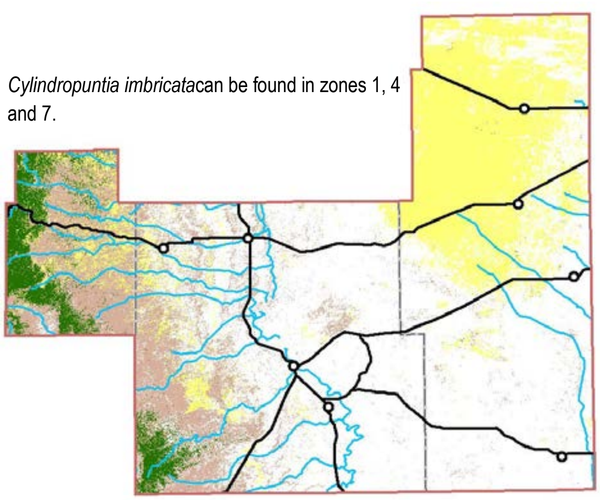
Similar Species: ***Fouquieria splendens*** (ocotillo) is sometimes confused with a cactus, but this spiny plant with many dead-looking stems is in its own family. It almost never branches, unlike *C. imbricata*, which is always branched.

Food: Tree cholla has edible flower buds, yellow fruits, and young stem joints. These plant parts were baked in underground pits. The flower buds were preferred because the fruits contain too many inedible seeds. An edible gum is exuded when fruits are cut off (Tull 2013).

Storage: Cooked and dried fruit could be stored for at least a year.

Archaeology: The wood from a *Cylindropuntia* species has been found in 23 sites across the CFO region. It is predominantly found in the Early Formative (17 sites), but is also in the Late Archaic (four sites) and Late Formative (three sites). This would have been a minor fuel species. Seeds of this plant have not been found in the CFO region.

*Cylindropuntia imbricata*can be found in zones 1, 4 and 7.



Tree Cholla

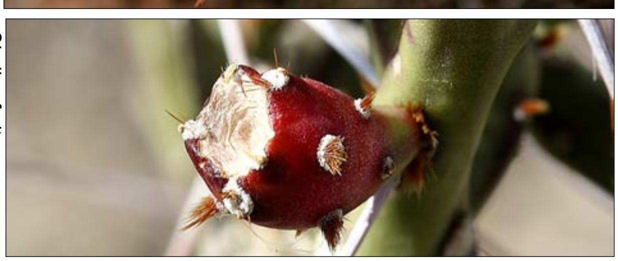
Tree Cholla –yellow fruit

Tree Cholla –flower


Christmas Cholla


Christmas Cholla –spines


Christmas Cholla -flower


Christmas Cholla –fruit

Cylindropuntia leptocaulis (DC.) F.M. Knuth (CYLE8)
Christmas Cholla, Tasajillo

An erect cactus with thin jointed stems.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x						
Fruit								x	x	x	x	x

Botanical Description: Spindly shrub, often found sheltered amongst other trees, up to 180 cm tall, grayish green or purplish, segments cylindrical. Flowers greenish yellow, small, 5–8 mm. Fruits fleshy, smooth, spineless, yellow becoming scarlet, 9–15 mm long by 6–7 mm wide. Seeds pale yellow, smooth, irregularly shaped, 3–4.5 mm diameter.

Phenology: Flowers spring–early summer but also sometimes in the fall.

Habitat: Grasslands and shrublands, scattered in Chihuahuan Semi-Desert Grassland.

Similar Species: This is a much smaller and overall more delicate cactus compared to *C. imbricata*.

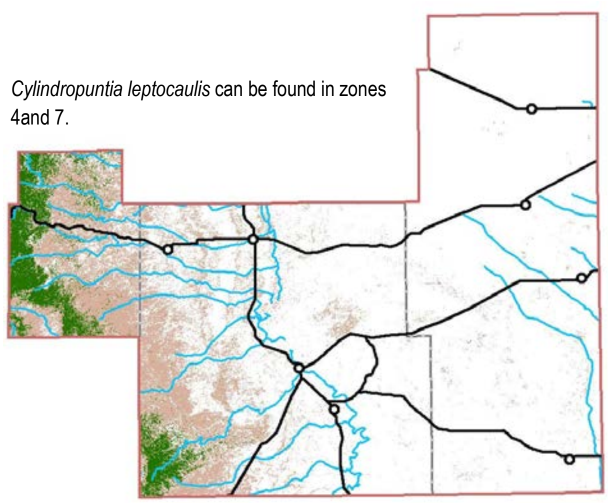
Medicine: Fruits were crushed and mixed with a beverage to produce a narcotic effect (Castetter and Opler 1936; Moermon 2009). The small fruits are edible raw (Tull 2013).

Storage: Limited storage capacity.

Archaeology: This taxon has not been found in the CFO region.

In the winter, when the red fruits decorate this scraggly plant, it deserves its name, "Christmas Cactus."

Cylindropuntia leptocaulis can be found in zones 4and 7.



Coryphantha macromeris (Engelm.) Lem. (COMA14)
Nipple Beehive Cactus

A colonial cactus, often mat-forming, flowers lavender to magenta.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower		x	x	x	x	x	x	x	x			
Fruit								x	x	x	x	x
Thorn	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Plants profusely branched, forming low mats up to 1 m in diameter. Stems 5–23 cm long by 4–8 cm wide. Spines 7–21 per areole. Flowers 30–50 mm by 40–70 mm, outer petals heavily fringed, inner petals 20–25 per flower, bright rose-pink or magenta. Fruits dark green, ovoid, 13–25 mm by 12–18 mm, with remains of flower persistent. Seeds small, round, reddish brown, 1.2–1.5 mm.

Phenology: Can flower February–September, with fruit August–December.

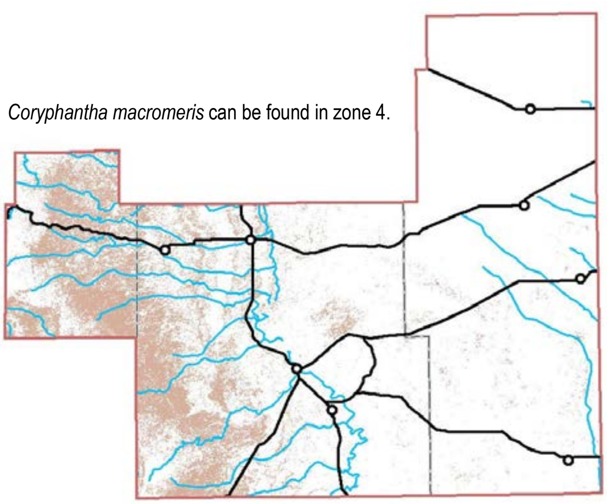
Habitat: Often found growing around the edges of gypsum soil outcrops. Chihuahuan Desert Scrub.

Similar Species: ***Coryphantha robustispina*** **ssp.** ***scheeri*** (Scheer pincushion) is a New Mexico State Endangered cactus. It is a low, hemispherical plant, up to 15 cm in diameter, with prominent bumps (tubercules) that bear one central curved spine and 6 to 12 radial spines. Flowers 5 cm wide, yellow with orange centers. Fruit 3 cm long by 1.5 cm wide, green, with juicy pulp. Seeds brown, smooth, 2–3 mm long. Flowers May to July, possibly as late as November. Grows on gravelly soils on limestone or gypsum, from 1,000 to 1,100 m elevation in Chihuahuan Desert Scrub.

No recorded uses.

Storage: Limited storage capacity.

Archaeology: *Coryphantha* has not been found archaeologically in the CFO region.



Coryphantha macromeris can be found in zone 4.

Nipple Beehive

This cactus contains potentially psychoactive substances which may have been used by Tarahumara shamans.

Nipple Beehive –plant and flower

Nipple Beehive –flower


Horse Crippler


Horse Crippler –flowers



Horse Crippler –spines

Echinocactus texensis Hopffer (ECTE)
Horse Crippler

A small hemispherical cactus always wider than tall, with ridges.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x							

Botanical Description: Stems unbranched, pale gray-green, flat-topped to hemispheric, usually deep-seated, 10–30 cm in diameter with 13–27 prominent ribs. Spines 7–8 per areole, 4–6 cm long. Flowers 5–6 cm in diameter, inner petals bright rose-pink to pale silvery-pink, the bases orange to red. Fruits are red, ovoid, 15–50 mm long by 15–40 mm wide, fleshy. Seeds black, glossy, 2.5–3 mm diameter.

Phenology: Flowers late spring.

Habitat: Chihuahuan Desert Scrub.

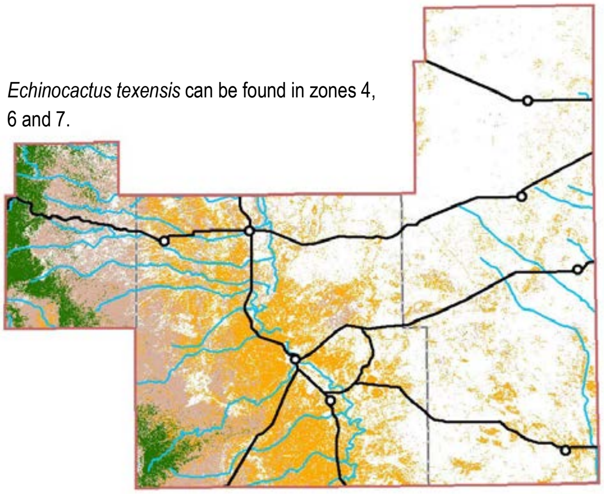
Similar Species: ***Echinocactus horizonthalonius*** is very similar but has ridges more whorled than *E. texensis*, and is often more hemispherical-shaped, whereas *E. texensis* is always wider than tall.

Uses: Strong spines could be used for needles.

Storage: Limited storage capacity.

Archaeology: The seeds from an *Echinocactus* species have been found in five sites across the CFO. It is predominantly found in the Early Formative (two sites), but is also in the Post Formative (one site). This would have been a minor food species. Wood from this plant has not been found in the CFO region.

Echinocactus texensis can be found in zones 4, 6 and 7.


Horse Crippler –flowers

Cactaceae - Cactus

Echinocereus coccineus Engelm. (ECCO5)
Scarlet Hedgehog Cactus

A small cactus always much taller than wide, with prominent ridges.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x						
Fruit							x	x	x			
Stem							x	x	x			

Botanical Description: Plants with many stems in a clump or loose mound. Stems cylindrical, 5–40 cm long by 4–15 cm wide, each with 6–14 ribs. Spines 5–16 in a cluster, mostly straight. Flowers 4–8 cm long, crimson or scarlet. Fruits greenish or yellowish or pinkish, pulp white.

Phenology: Flowers March–June.

Habitat: North-facing slopes with limestone rock and gravel, in the Guadalupe foothills.

Similar Species: ***Echinocereus triglochidiatus*** lacks a central spine, or, if present, it is angular, whereas *E. coccineus* has round (in cross-section) or sometimes flattened spines.

Food: Fruit eaten raw (Castetter and Opler 1936).

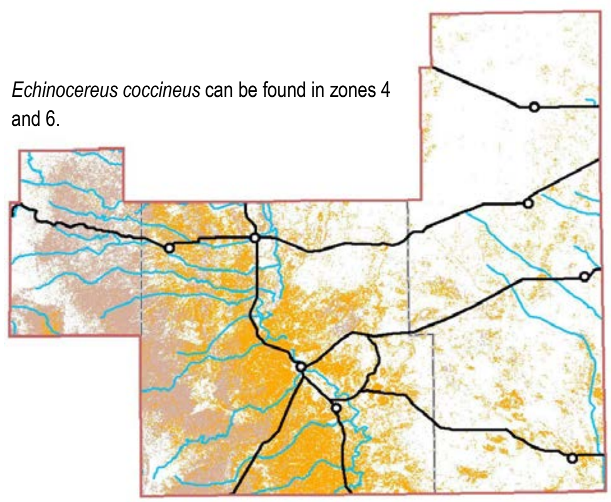
Medicine: Although no documentation was found for SE NM ethnobotanical use as medicine, this cactus has been documented as a heart stimulant (Elmore 1944), although it is also considered poisonous.

Storage: Limited storage capacity.

Archaeology: This taxon has not been found in the CFO region.

Scarlet Hedgehog

Scarlet Hedgehog –flower



Echinocereus coccineus can be found in zones 4 and 6.

Tree cholla makes excellent firewood that burns hot, with a bright flame, and is almost smokeless (see page 133 for species treatment.) Due to the open weave structure of the wood, it also makes an excellent torch. The "open weave" provides ventilation for the flame in an equilibrium of fuel-heat-oxygen. The wood is strong but lights quite easily and stays lit. In *Life Among the Apaches*, Cremony documents the movement of a number of Apaches across the nighttime landscape that moved by torch light. The odds are that the torches were tree cholla. Cattail also makes a good torch, but you have to soak it in fat or oil for an extended period of time, which (both oil and time) was often scarce for nomads on the run; whereas, dried cholla can just be picked up off the ground. It makes a good fire starting wood for poorer/smokier woods or damp days. These uses, plus its excellence as a torch is probably why you find it frequently in the archeological record even though it doesn't produce large coals for cooking. (Cremony 1868, pg 156)

Pink Flower Hedgehog

Echinocereus fendleri (Engelm.)
Pink Flower Hedgehog Cactus
Sencke ex J.N. Haage (ECFE)

A small cactus always much taller than wide, with prominent ridges.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x						
Fruit							x	x	x			

Botanical Description: Stems solitary or few in a cluster, cone-shaped, 10–15 cm tall, 7–10 cm wide; ribs 7–12. Flowers 6–12 cm in diameter, magenta and green. Fruit 3–5 cm long, red with white somewhat juicy pulp, usually bursting at seams. Seeds are small, black, 1.5 mm long, covered in small bumps.

Phenology: Flowers May–June.

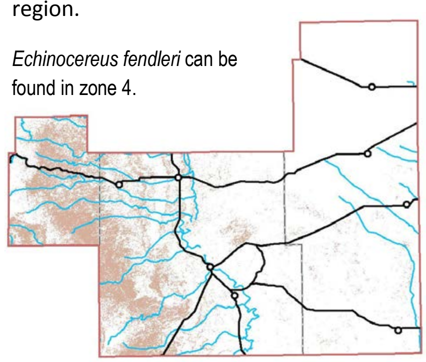
Habitat: South slopes with limestone gravel and cobble, relatively open Blue Grama grassland, 1,585—2,012 meter elevation.

Food: Fruit eaten raw (Castetter and Opler 1936).

Storage: Limited storage capacity.

Archaeology: This taxon has not been found in the CFO region.

Echinocereus fendleri can be found in zone 4.



Pink Flower Hedgehog

Hedgehog seeds

Pink Flower Hedgehog -flower

Echinocereus reichenbachii
(Terscheck ex Walp.) hort ex Haage (ECRE)
Lace Hedgehog Cactus

A common small, fuzzy cactus of grasslands.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x						
Fruit									x	x		

Botanical Description: Stems unbranched to several-branched, erect, cylindric, 7.5–30 cm long by 4–10 cm wide. Spines 15–36 per areole, 2–8 mm long. Flowers 4.5–8 cm diameter, inner petals silvery pink to magenta, usually white, red, green, or multicolored at the base. Fruits green, 15–28 mm, pulp white.

Phenology: Flowers early May–late June, fruiting a couple months later.

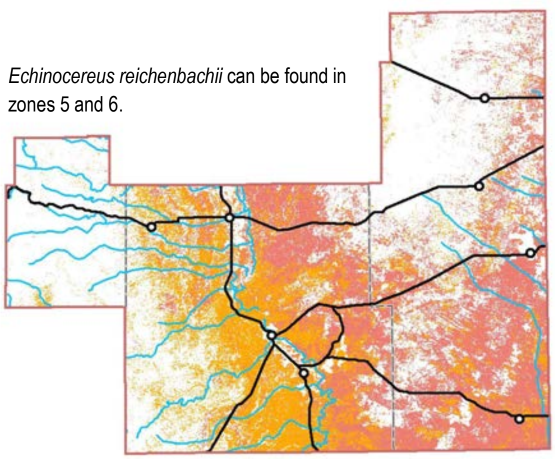
Habitat: Chihuahuan Desert Scrub, Chihuahuan Semi-Desert Grassland.

Similar Species: ***Echinocereus viridiflorus*** is similar, but with smaller (up to 2.5 cm diameter) greenish yellow flowers.

No recorded uses.

Storage: Limited storage capacity.

Archaeology: This taxon has not been found in the CFO region.




Lace Hedgehog

Lace Hedgehog -spines

Lace Hedgehog –flower


Lace Hedgehog –stigma

Spinystar

Spinystar–spines

Spinystar–spines

This genus has also been called *Coryphantha*.

Escobaria vivipara (Nutt.) Buxbaum (ESVI2)
Spinystar

A common cactus with tubercules.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x	x	x				
Fruit						x	x	x	x	x	x	

Botanical Description: Plants usually unbranched, stems usually stiff and erect, usually mostly above ground, cylindrical, 2.5–20 cm tall by 3–11 cm wide. Spines 11–55 per areole. Flowers 20–57 mm by 25–67 mm, outer petals fringed, inner petals 21–56 per flower, pale rose-pink to magenta. Fruits green turning dull brownish red, ovoid.

Phenology: Flowers April–August, fruiting 2–5 months later.

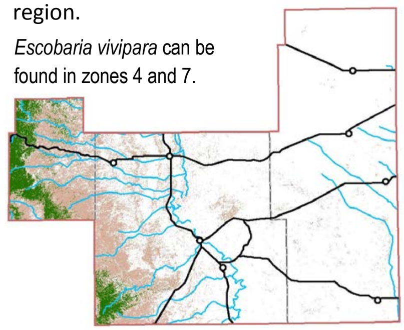
Habitat: Chihuahuan Desert Scrub. Chihuahuan Semi-Desert Grassland, Mesquite Scrub; widely distributed.

No recorded uses.

Storage: Limited storage capacity.

Archaeology: This taxon has not been found in the CFO region.

Escobaria vivipara can be found in zones 4 and 7.



Spinystar–seeds. Marks =0.5 mm

Spinystar–flower

Mammillaria grahamii Engelm. (MAGR9)
Graham's Nipple Cactus

A small cactus with fish-hook spines.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x							
Fruit						x	x	x				

Botanical Description: Long spines are hooked and the entire cactus is always less than 15 cm wide. It is named for the nipple-like projections with spines at the tip, but they are often obscured by thick interlocking spines. Flowers are pink and lavender.

Phenology: Flowers April and May.

Habitat: On south-facing limestone ridges, often with *Agave lechugilla* around 1,370 m elevation in the foothills of the Guadalupe Mountains.

Similar Species: There are two other uncommon *Mammillaria* species in the foothills of the Guadalupe Mountains, ***Mammillaria lasiacantha,*** and ***M. heyderi.***

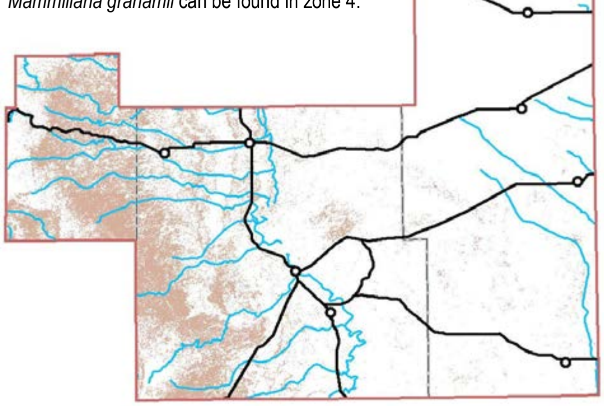
Food: Fruits eaten fresh, or dried fruit was cooked and eaten (Castetter and Opler 1936).

Medicine: Although no documentation was found for SE NM ethnobotanical use as medicine, this cactus has been boiled and placed in ears for earaches, and to assist with removing wax from the ears (Curtin 1949).

Storage: Limited storage capacity.

Archaeology: The seeds from a *Mammillaria* species have been found once in the CFO. This would have been a minor food species. Wood from this plant has not been found in the CFO region.

Mammillaria grahamii can be found in zone 4.



Graham's Nipple

Graham's Nipple

Graham's Nipple – flowers

Purple Prickly Pear

Purple Prickly Pear –flower, spines & fruit

Cooking Nopal with Mescal:
Prickly pear pads were placed on the hot rocks immediately before piling agave hearts into pit. The prickly pear pads provide steam and a mild acid that helps to break down the toxins in the agaves. The pit is then covered with more pads and twigs and dirt to hold in the steam and heat.

Purple Prickly Pear

*Opuntia macrocentra Engel (*OPMA8)
Purple Prickly Pear, Nopal
Gułchíde (Mescalero Apache)

A shrubby cactus with flattened, pancake-shaped stems.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x					
Fruit								x	x	x	x	
Stem								x	x			

Botanical Description: *Opuntia* are recognized by their flat stems, often called pads. *Opuntia* species also have glochids (small barbed spines). This species has long (5–12 cm) dark spines at the margins of the purplish pads. All *Opuntia* species hybridize with all other members of the genus they contact, so species are difficult to tell apart.

Phenology: Flowers March–July.

Habitat: Scattered in grasslands and shrublands. Mesquite Scrub, Chihuahuan Semi-Desert Grassland, and Chihuahuan Desert Scrub.

Similar species: *O. macrocentra* is usually larger that other *Opuntia* in the area; *O. phaeacantha* is slightly smaller overall, with generally greener pads and spines slightly shorter (1.9–6.9 cm). *O. polyacantha* is the smallest overall, with the smallest spines (2–3.5 cm) and smaller, wrinkled pads.

Food: Unpeeled fruit was split, dried, and stored for future use, or eaten fresh (Basehart 1960). The fruit is a good source of Vitamin C and sugar. The pads contain fewer carbohydrates but are rich in Vitamin A. Four to six women would collect the fruits (or *tunas*) together. The fruit ripened in September and was collected at that time (Basehart 1960). For a few weeks this was the dominant food source, and many people traveled to the region specifically to feast on *Opuntia* fruit. The fruit was considered more of a delicacy and tastier after it had been frost-bitten twice (Basehart 1960).

After collecting the tunas, the women put them in baskets to avoid mashing when returning to camp. Wooden tweezers, usually made from oak, were used to remove the fruits from the plant (Basehart 1960). The custom was to take the first pair of black tunas that were gathered and rub them on the tip of the ear to avoid illness, including double vision and severe headaches, as they believed the fruit could potentially be dangerous (Basehart 1960). The wooden tweezers used to gather the tunas were left with the cactus because if they were brought back to camp it was feared that children playing with them might draw in snakes (Basehart 1960).

Medicine: Used as a dermatological aid: mature pads were used as a poultice for wounds, burns, boils, to stop bleeding, as an antiseptic, and as an analgesic. For eye medicine spines from the cactus were used to scrape infected eyelids or infected tattoos. It was used as an anti-diarrheal and eaten to ease swollen prostate. As an urinary aid teas were made to treat urinary tract infections. Tea was also made to fight tuberculosis and generally strengthen the immune system (Basehart 1960). It has also been found to be beneficial in lowering cholesterol, and preventing diet-related cardiovascular disease and adult-onset diabetes (Moore 1997).

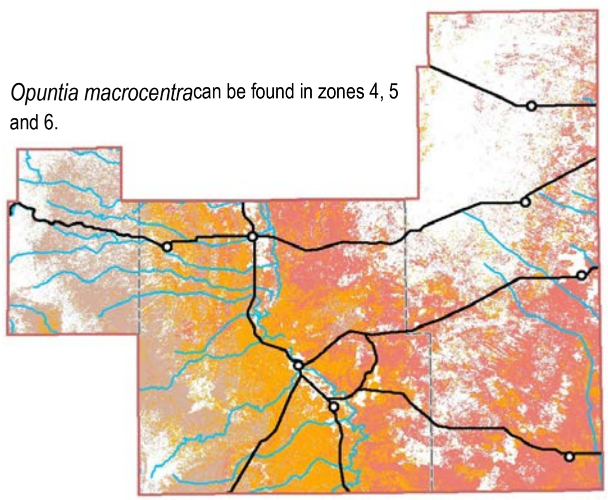
Storage: Limited storage capacity. Fresh fruit will last for several months on the stem.

Archaeology: The seeds from an *Opuntia* species have been found in seven sites across the CFO. It is found in the Post Formative (two sites) and the Early Formative (two sites). This would have been a minor food species. Wood from this plant has been found once in the CFO region.

Purple Prickly Pea r – developing spines

Did you know?
Prickly pear pads could be used as containers and even canteens.

Opuntia - Seed



*Opuntia macrocentra*can be found in zones 4, 5 and 6.

Purple Prickly Pea r –pad & flowers

Purple Prickly Pea r –fruit

Purple Prickly Pea r –flower

Prickly pear stands are a common site in the CFO region, important as a food source for many cultures.

Atriplex canescens

(Pursh) Nutt. (ATCA2)

Fourwing Saltbush

A medium/large-size, gray-green bush of grasslands and shrublands.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x	x		
Leaves	x	x	x	x	x	x	x	x	x	x	x	x
Root	x	x	x	x	x	x	x	x	x	x	x	x
Seed	x	x								x	x	x

Botanical Description: Large shrubs 80–200 cm tall. Leaves perennial, alternate, 1–4 cm long by 3–8 mm wide. Fruits 8–25 mm wide with four prominent wings. Seeds are irregularly shaped, 1.5–2.5 mm wide, with jagged edges.

Phenology: Flowers June–October.

Habitat: Often found growing in mixed grassland-shrublands, including Mesquite Scrub and Chihuahuan Semi-Desert Grassland and along swales and other areas with increased water. In ungrazed and unburnt portions of Great Plains Shortgrass Prairie.

Dye: The leaves, twigs, and blossoms make a bright yellow dye (Tull 2013).

Food: Greens (cooked as potherbs) and seeds are edible, although some sources report that they must first be boiled for several hours (Tull 2013). The leaves and young shoots of saltbush have a salty taste (hence the name) and were cooked as vegetables or added to meat and other foods for flavor. Leaves could also be boiled in water, strained, and fried in grease. The seeds were ground and parched to make a meal that could be mixed with cornmeal to make a variety of mushes and cakes. They were also used to make a salty pinole. Ashes from this shrub were mixed with corn dough for making wafer bread.

Forage: This plant is probably most valuable as a high-quality forage. It is tolerant of saline and alkaline soils but is susceptible to heavy grazing. In overgrazed areas it is mainly found along road rights-of-way. It was used as fodder for livestock including cattle, goats, horses, and sheep (Castetter 1935).

Medicine: Although no documentation was found for SE NM Native people, this plant was used by other Native people for a wide variety of health conditions. The leaves were made into a soapy lather that was used for itches or rashes, such as chickenpox or measles (Weber and Seaman 1985). It could also reduce pain and swelling from ant bites (Cook 1930). Smoke from burning twigs and leaves was used to revive a weak person or to treat epilepsy (Cook 1930). The ashes could be added to corn to make hominy. The leaves could be made into a tea for treating nausea and vomiting from the flu, breaking fevers, and for general stomachaches. A poultice was applied to the chest to treat colds or cough or sore muscles. This plant has also been used to purify water.

Other uses: Leaves were rubbed in water to produce a lather for washing clothes and baskets.

Wood: An important source of firewood.

Fourwing Saltbush

Fourwing Saltbush—male on the left, female on the right.

Fourwing Saltbush –flowers

Fourwing Saltbush – flowers

Atriplex canescens
(Pursh) Nutt. (ATCA2)
Fourwing Saltbush
...continued.


Fourwing Saltbush –green fruit

This shrub is easily identified by the green (fresh) or tan (dried) four-winged fruit. Only female plants produce winged fruit, and when the fruit are not present this large shrub is rather drab and surprisingly inconspicuous. It is extremely tolerant of soil salt content. The name derives from the fact that it excretes salt from its leaves.


Fourwing Saltbush –green fruit


Fourwing Saltbush –dried fruit

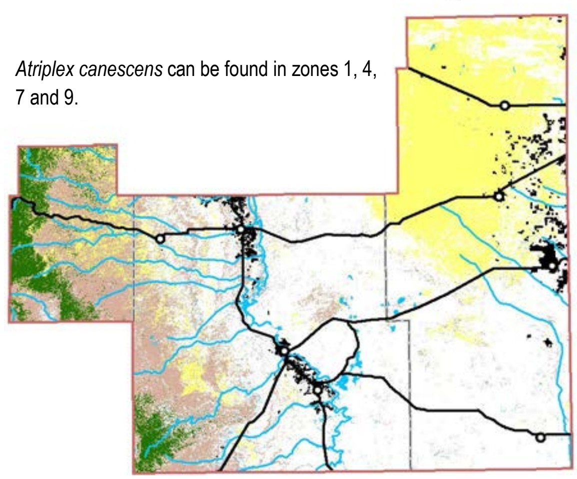

Fourwing Saltbush –dried fruit

Storage: Dried seeds and plant parts could be stored for several years.

Archaeology: The use of *Atriplex* and *Krascheninnikovia* in the archaeological record is restricted to wood, found in 85 sites in the CFO region. In sites where dating can be correlated with plant remains, the majority are in the Early Formative (35 sites). The rest are Early Archaic (1 site), Late Archaic (9 sites), Late Formative (15 sites), and Post Formative (2 sites). The number of sites and temporal spread across most time periods places *Atriplex* and *Krascheninnikovia* taxa as important supplementary wood resources in the CFO region.

Atriplex canescens - Britton, N.L., and A. Brown. 1913.

Atriplex canescens can be found in zones 1, 4, 7 and 9.



Bassia scoparia
(L.) A.J. Scott (BASC5)
Kochia, Burning Bush

Fuzzy-leaved tumbleweed.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x	x	x		

Botanical Description: Annual weed up to 100 cm tall. Stems erect, bushy. Leaves are alternate, narrow, 2–5 cm long and only 3–7 mm wide, usually very fuzzy, especially when young. Flowers greenish, in spikes 5–10 cm long. Fruit enclosed in persistent sepals, 2.5 mm wide, star-shaped. One small brown seed per fruit, 1.5 mm wide, wedge-shaped, flat, slightly ribbed.

Phenology: Seedlings are visible in early spring. By mid-summer the plant can be over 2 m tall.

Habitat: Disturbed pastures. This plant, along with ***Salsola tragus***, can form monoculture stands in abandoned farm fields and other disturbed areas. Tumbleweeds often pile up along fences.

Similar Species: ***Cycloloma atriplicifolium*** (winged pigweed) is a species of spindly tumbleweed-shaped weeds on sand dunes. The seeds have fuzzy margins.

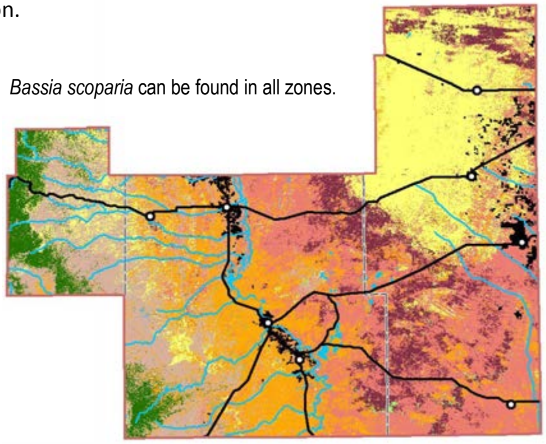
No Recorded Uses.

Storage: Dried seeds and plant parts could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.


Kochia

This classic tumbleweed is not native to the region. It was introduced from Central Asia in the early part of the 20th century and is now omnipresent throughout the West.




Kochia –flower

Kochia –seeds.


Kochia –seeds

Lambsquarters

Chenopodium album L. (CHAL7)
Lambsquarters, Goosefoot,
Quelite It' ąą' ńk (Mescalero Apache)

Flowering spikes with small green ball-shaped flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x					
Leaves		x	x	x	x	x	x					
Root			x	x	x	x	x					
Seed				x	x	x	x	x	x	x		

Botanical Description: Annual plant with stems erect or sprawling, with or without many branches, 10–300 cm long, covered in a white, mealy powder. Leaves lance-shaped with shallow serrate edges, white on the undersides. Flowers are in spikes of small green balls, 3–4 mm diameter. Seeds black, smooth (or slightly ridged), flattened like a lens, 0.9–1.6 mm diameter.

Phenology: Flowers spring–early summer but also sometimes in the fall.

Habitat: Disturbed areas.

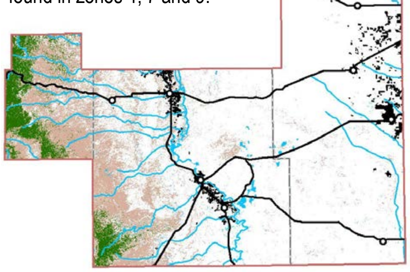
Similar Species: This species is difficult to distinguish from *C. berlandieri* because the leaf shape is variable, although the latter usually has at least the lower main leaves toothed. Both species are distinguishable from other species of *Chenopodium* that have multiple veins from the base of the leaf.

Food: The young plants of *Chenopodium* sp. were gathered and cooked and used as greens (Castetter 1935). The leaves are high in vitamins A and C.

Storage: Dried seeds and plant parts could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Chenopodium album can be found in zones 4, 7 and 9.



Chenopodium ambrosoides (Epazote) is the characteristic Mexican seasoning found in refried and boiled beans. It is stronger-tasting than wild *Chenopodiums* (Tull 2013).

Lambsquarters –leaf

Lambsquarters –flowers

Chenopodium berlandieri Moq. (CHBE4)
Pitseed Goosefoot, Quelite

Flowering spikes with large green balls, 4–7 mm diameter.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x						
Leaves		x	x	x	x	x						
Root/			x	x	x	x	x					
Seed						x	x	x				

Botanical Description: Annual plant with stems usually erect, with or without many branches, 10–100 cm tall, covered with a white, waxy powder. Leaves triangular to lance-shaped, 1–12 cm long by 0.5–7.5 cm wide, more or less serrate edges. White dust on leaves is made up of deflated trichomes that contain mineral salts—an important resource in the desert. Flowers are in spikes of small green balls, 4–7 mm diameter. Seeds brown to black, honeycomb-pitted, lentil-shaped, 1–2 mm diameter.

Phenology: Flowers late spring.

Habitat: Disturbed areas. *Chenopodiums* are self-seeding annuals. Seeds have been reported to remain viable for 40 years. Single plants produce up to 100,000 seeds (Blair 2014).

Similar Species: ***C. album*** is similar***, but C. berlandieri*** can be distinguished by its smelly leaves, which have been compared to dirty socks (Tull 2013).

Food: Similar to *C. album.* Lipan Apache dried mature stems and threshed the seeds on a windy day. The hard seeds were pounded and eaten with sotol, mescal, or yucca fruit (Opler 1935). Wild greens can be used like spinach, i.e., they are edible raw when young and steamed when older. Roots make a nourishing soup. For more information see Blair (2014), *The Wild Wisdom of Weeds*.

Storage: Dried seeds and plant parts could be stored for several years.

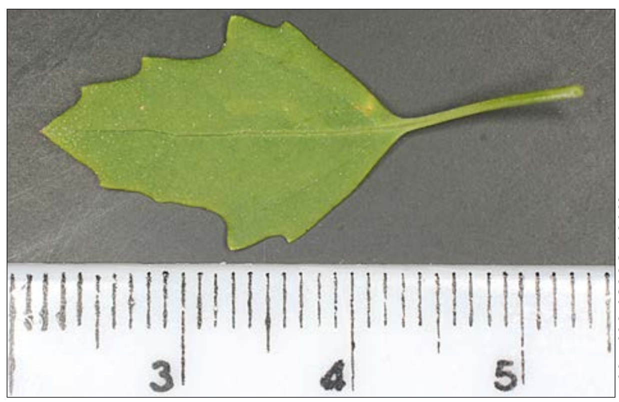
Archaeology: Archaeological *Chenopodium* has been found in 27 sites across the CFO region. Where dated remains are available (12 sites), the majority of finds are in the Early Formative (eight sites), with two Late Archaic sites and two Late Formative sites. *Chenopodium* species have been found across the United States in archaeological contexts, with a sub-species of domesticated *Chenopodium* named (*C. berlandieri* spp. *Jonesianum;* Smith and Funk 1985). Where *Chenopodium* seeds were heavily used by archaeological cultures, they show up in the thousands in burning contexts.

The small number of sites and low numbers of seeds found lead to the interpretation that *Chenopodium* taxon was a minor economic species in the CFO region.

Many domesticated vegetables and grains come from this family, including spinach (*Spinacia oleracea*), beet (including beet root, sugar beet, and chard) (*Beta vulgaris*), and quinoa (*Chenopodium quinoa*).

Pitseed Goosefoot

Goosefoot was one of the earliest wild staple plants and became one of the earliest domesticated crops. The *Chenopodiums* in the Carlsbad area are closely related to Quinoa (*Chenopodium quinoa*).



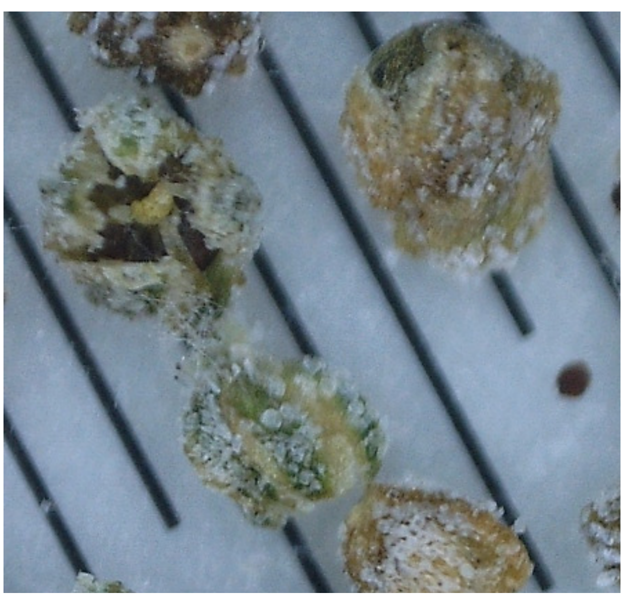
Pitseed Goosefoot –leaf

Pitseed Goosefoot –flower

Chenopodium berlandieri Moq. (CHBE4)
Pitseed Goosefoot, Lambsquarter, Quelite

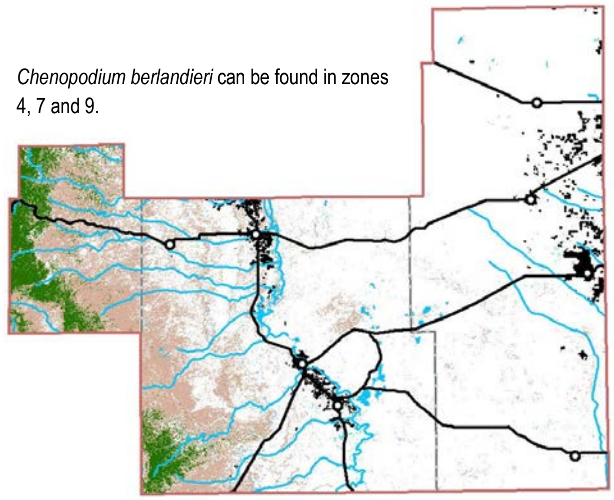
Pitseed Goosefoot –flower

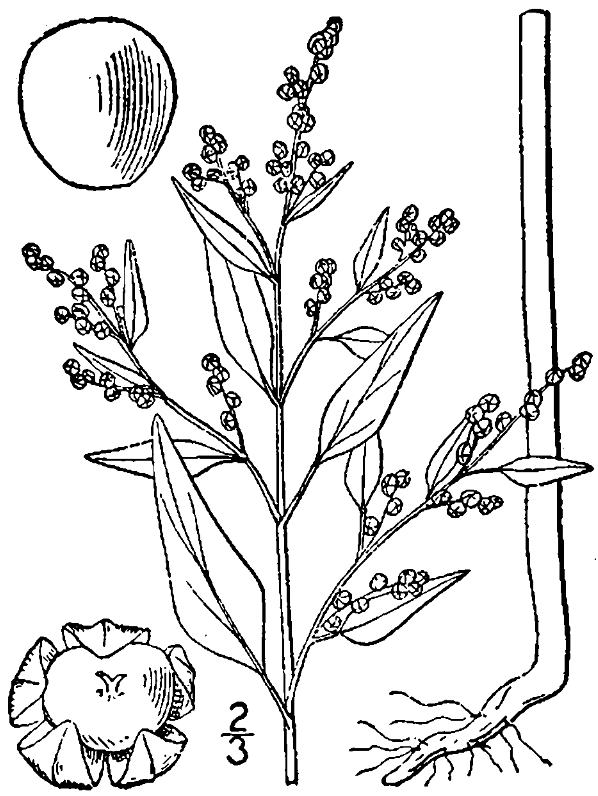
Pitseed Goosefoot –magnified leaf



Magnified fruits and seeds. Long marks = 1 mm

Chenopodium berlandieri can be found in zones 4, 7 and 9.





Chenopodium berlandieri : from Britton, N.L., and A. Brown. 1913

Kraschenninikovia lanata (Pursh) A. Meeuse & Smit (KRLA2)

Winterfat

Short silvery shrub or subshrub.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x					
Leaves				x	x	x	x	x	x	x	x	
Seed							x	x	x			

Botanical Description: Also called *Eurotia lanata***.** Perennial small shrub with multiple stems arise from a woody base, 10–50 cm tall. Entire plant covered in white hairs. Leaves 1–3 cm long by 1.5–3.5 cm wide, edges curled, prominent midvein on underside. Flowers and fruits are in fuzzy white spikes that persist throughout the winter. Fruits are densely hairy, 2.5–3.5 mm.

Phenology: Flowers May–July, fruits form through September.

Habitat: Flat areas with loamy soils, often sparsely vegetated; Mesquite Scrub.

Forage: Considered a good livestock forage and horse feed plant by the Hopi, Havasupai, Navajo, and Keres—and modern ranchers.

Medicine: (Hopi, Tewa, Zuni) Root, powdered or poultice for burns. Leaves used as a febrifuge, and for rashes, poison ivy, chickenpox, boils, and other skin ailments.

Storage: Dried seeds and plant parts could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.


Winterfat


Winterfat


Winterfat –flowering spike


Winterfat –seed


Winterfat –leaves

Russian Thistle

Russian Thistle –flower

Russian Thistle –flower close-up

Salsola tragus. (SATR12)
Russian Thistle

Spine-tipped leaves. Stem often with red vertical lines.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x	x		
Leaves					x	x	x	x	x	x	x	
Seed							x	x	x	x	x	

Botanical Description: Annual weed up to 100 cm tall. Stems erect, rigid, and much branched, often with red streaks. Leaves alternate, narrow, 1–6 cm long, less than 1 mm wide with a spiny tip. Flowers: greenish or pinkish white along stem. Fruit thin-walled with a single horizontal seed, surrounded by persistent, spiny, bracts. Seed black, spherical.

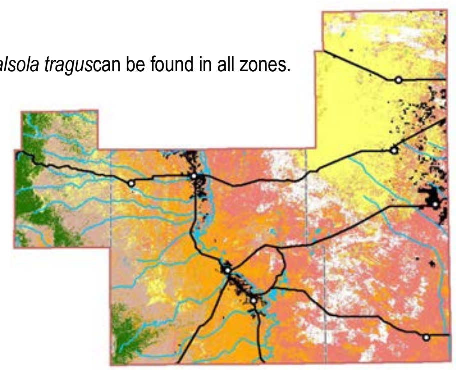
Phenology: Flowers June–October.

Habitat: Disturbed pastures. This plant, along with *Bassia scoparia,* can form monoculture stands in abandoned farm fields and other disturbed areas.

Food: Young green leaves and shoots can be eaten as a cooked vegetable (Tull 2013).

Storage: Dried seeds and plant parts could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.



*Salsola tragus*can be found in all zones.

Salsola tragus—seed

Russian Thistle is a non-native plant accidentally imported from Russia with agricultural seed stock in the late 1800's. It is now ubiquitous across the southwest, considered invasive, and classed as a noxious weed in some states.

Commelina erecta L. (COER)
Whitemouth Dayflower

Two blue petals on lily-like leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x	x	x	x	
Leaves					x	x	x	x	x			
Root							x	x	x	x	x	x

Botanical Description: Perennial herb with fleshy, tufted roots. Stems branching. Leaves sheathing the stem, linear 2.5–17 cm long, 0.3–3 cm wide. Flowers solitary or clustered in a specialized folded leaf, 1.0–2.5 cm long, and 0.7–1.5 cm wide. Flowers are 1.5–4 cm wide, upper petals blue, lower petal minute, white, almost hidden. Fruits are 3.5–4.5 mm long, 3–5 mm wide, green, fleshy, splitting open. Seeds three per fruit, brown, with soft, whitish tissue, 2.4–3.5 mm long by 2.3–2.8 mm wide, smooth.

Phenology: Flowers July–November.

Habitat: Grasslands to forests, sometimes common on Sandhill Shrubland in the late summer.

Similar Species: ***Commelina dianthifolia*** has three blue petals, usually at higher elevations than *C. erecta.* ***Tradescantia occidentalis*** is a purple-flowered form of dayflower, more common east into Texas. It is also edible.

Food: Tender shoots are edible raw or cooked. Starchy roots may be edible, but may also contain a high amount of saponins, which can cause intestinal upset (Tull 2013).

Medicine: A tea of the mucilaginous leaves is used for sore throats because of the antibacterial properties (Elpel 2006).

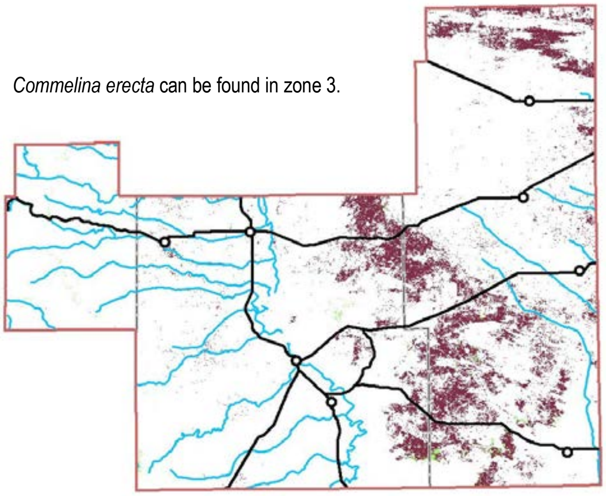
Storage: Very little storage potential.

Archaeology: Phytoliths from this taxon are found in many archaeological sites from surface samples in the CFO region.

Whitemouth Dayflower

Whitemouth Dayflower –leaf

Whitemouth Dayflower –flower




Watermelon –leaf


Watermelon –flower


Watermelon –leaves and fruit

Watermelon –seeds

Citrullus lanatus (Thunb.) Matsum. (CILAC2) Watermelon

A wild watermelon vine with tendrils and divided leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x					
Fruit							x	x	x			

Botanical Description: Annual vine with hairy stems and deeply lobed leaves. Leaves alternate, stalked, 10–18 cm long. Flowers yellow, 5-petals, opening completely (not bell-shaped like *C. foetidissima*), about 3.8 cm diameter. Fruit is a spherical or oblong melon, dark to light green, often mottled or striped, up to 60 cm long, with red to white flesh. Seeds are white, black or reddish, 5–15 mm long, flat, smooth.

Phenology: Flowers following spring rains, June to July.

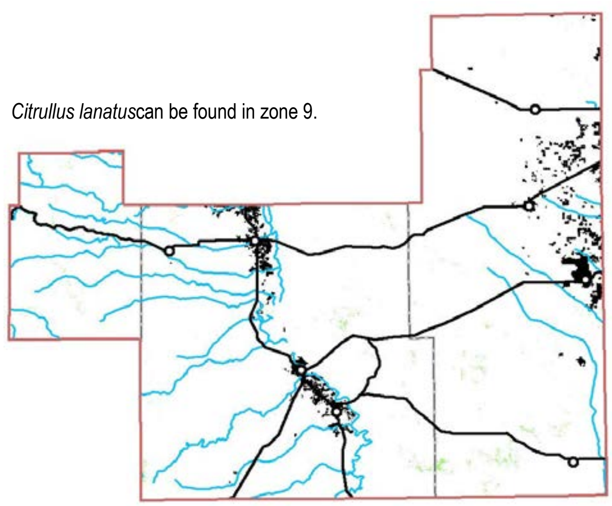
Habitat: Disturbed areas.

Food: This is a weedy version of domesticated watermelons, so the fruit is edible. The seeds are also edible, if baked. It probably escaped from cultivation by early Anglo settlers.

Storage: Processed seeds could be stored for several years.

Archaeology: This taxon was not found in the CFO region.

*Citrullus lanatus*can be found in zone 9.



Cucurbita foetidissima Kunth (CUFO)
Buffalo Gourd, Calabacilla, Amarga, Missouri Gourd

A large, sprawling vine with sandpapery leaves and a pungent foul odor.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x	x			
Fruit							x	x	x	x	x	
Root	x	x	x	x						x	x	x
Seed								x	x	x	x	x

Botanical Description: Perennial vine from a thick taproot, stems spreading up to several meters, forming large leafy mats. Leaves alternate, 10–20 cm long, triangular, sandpapery, foul-scented. Flowers from leaf bases, large, 5–12 cm across with five united petals, yellow. Fruit: a spherical hard-shelled gourd, greenish orange, 5–10 cm diameter with many seeds.

Phenology: Flowers May to September.

Habitat: Dry, disturbed areas.

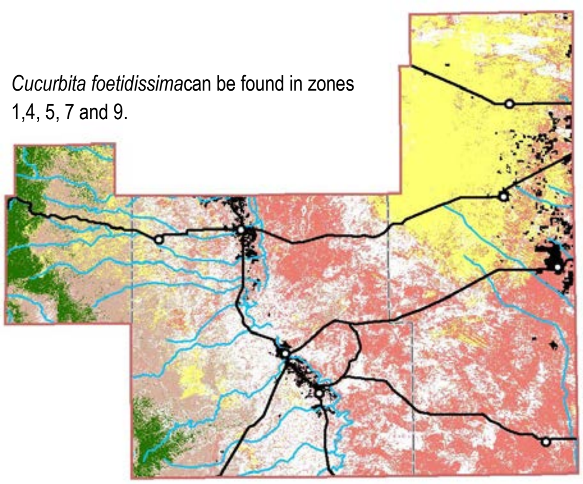
Similar Species: Coyote gourd or coyote melon, *Cucurbita palmata*, is a similar species, but it grows along the Colorado River in southern California and Arizona.

Food: Fruits contain toxic compounds, but when properly washed and roasted the seeds were a nutritious food. The roots were pounded and the edible starch washed from the bitter fibers. These plants are fast-growing. One root grew to weigh 88 pounds in 4 years (Tull 2013).

Medicine: The root was boiled and the resulting infusion used to relieve chest pains and as a powerful laxative. The Western Apache used a poultice of the roots as a cleansing agent to heal sores or boils (Curtin et al. 1997). The root is also a source of soap-like compounds. The Western Apache mashed the entire plant in hot water to clean saddle sores on horses (Buskirk 1986). Lipan Apache mix the seeds with other medicine for lung trouble (Opler 1935).

Storage: The dry fruit can be stored indefinetly in the proper conditions., processed roots and seeds for several years.

Archaeology: This taxon was not found in the CFO region.




Buffalo Gourd


Buffalo Gourd –flower


Buffalo Gourd –fruit


Buffalo Gourd –seeds


Alligator Juniper


Alligator Juniper –branches & leaves


Alligator Juniper –cones


Alligator Juniper—close-up of leaves

Juniperus deppeana Steud., (JUDE2)
Alligator Juniper

Tough scale leaves and cones, and distinctive rectangular plate bark.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Fruit	x	x							x	x	x	x
wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Shrub or tree, single-trunked, 7–15 m tall. Bark is deeply fissured into rectangular plates, like alligator skin. Leaves scale-like. Seeds 4–5 per berry-like cone, 6–9 mm long, ovoid, angular, blue green turning brown.

Phenology: Evergreen. Flowers with summer rains, as opposed to *J. monosperma*, which flowers in early spring.

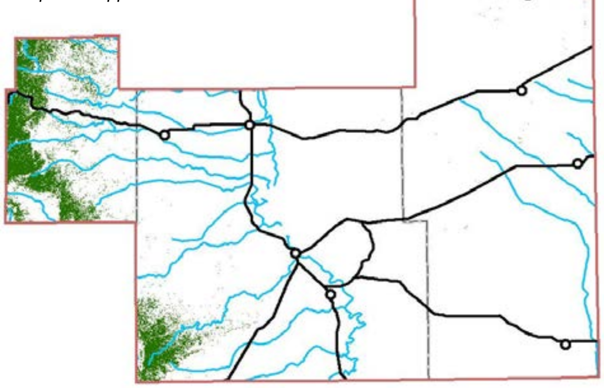
Habitat: Above 1,524 m on north side of the Guadalupe Mountains.

Food: Cones (i.e., berries) eaten fresh or boiled (Castetter 1935), and made into jelly or preserves (Castetter and Opler 1936). Lipan Apache prepared the cones by cooking them with hot rocks in a wooden bowl (Opler 1935).

Storage: The cooked fruit would need to be used immediately, but made into a processed food product, could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Juniperus deppeana can be found in zone 7.




Alligator Juniper–bark

Juniperus monosperma (Engelm.) Sarg., (JUMO)
Oneseed Juniper
Diłtałe, gadéeyu, tał (Mescalero Apache)

Tough scale leaves and cones, similar to *J. pinchotii*, but cones are resinous, not sweet.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower		x	x	x								
Fruit							x	x	x	x	x	x
Leaves	x	x	x	x	x	x	x	x	x	x	x	x
Root							x	x	x	x	x	x
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Shrubs or small trees to 7 m tall, usually branching near the base. Bark of trunk gray to brown, exfoliating in thin strips, bark of small branches smooth. Leaves scale-like, 1–3 mm, overlapping less than one-quarter their length, dark green. Seed cones mature in 1 year, ovoid, 6–8 mm, reddish blue to brownish blue, fleshy and resinous with one seed. Seed 4–5 mm in diameter.

Phenology: Evergreen. Flowers in early spring, as opposed to *J. pinchotii* (Pinchot's juniper), which flowers with summer rains.

Habitat: At higher elevations and latitudes than *J. pinchotii*.

Similar Species: There is a fourth juniper species found in the CFO region, ***Juniperus scopulorum*** Sarg., **Rocky Mountain Juniper**, Rocky Mountain juniper, a small evergreen tree to 35 feet, often with an irregular crown. Occurs in mixed or pure stands of open scrub woodland over Wyoming and Colorado at elevations of 5,000 to 7,500 feet, often on dry, rocky ridges. Fruits blue with whitish bloom, fleshy "berries" (cones), 1/4 inch in diameter, ripening the second season, seeds 1 to 2 inches each cone, bony-coated. Has been documented use as an Apache food:

Ceremony: Juniper leaves were widely used for ceremonial purposes; for example, the Comanche placed juniper leaves on a fire and inhaled the smoke for purification (Carlson and Jones 1942).

Construction: Used for tepee poles (Basehart 1974). Wood used for fence posts throughout the West.

Food: Cones were roasted, water added and the mixture made into a gravy (Castetter and Opler 1936). Berries were boiled, ground, or mashed and used with other foods (Basehart 1974). Tull (2013) reports fruit (cones) are not edible, but a few berries can be used as seasoning.

Fuel: Wood was used to heat cooking stones and bark used for tinder for fire drills (Basehart 1974).

Medicine: Juniper berries are used to clear out cystitis and urethritis and prostate issues (Moore 1997). They are also good for stomach and kidneys, flatulence, and gout (Tierra 1994). White Mountain Apache used an infusion of leaves for colds and coughs (Reagan 1929).

Medicine (continued): Lipan Apache also used an infusion to treat sore throats. They inhaled smoke from juniper leaves as a decongestant, and used a poultice of the leaves to treat rheumatism (Opler 1935).

Oneseed Juniper

Oneseed Juniper –berries

Did you know?

Juniper berries, which are also called cones, are used to make gin. Typically, berries of *Juniperus communis*, common juniper, are used.

Oneseed Juniper –bark

Weapons: Used to make bows and tools to make handles for scrapers (Basehart 1974).

Other: Causes severe hay fever when it releases large amounts of pollen in the early spring.

Storage: The fruit would need to be processed immediately, the leaves and stems could be stored for several years.

Oneseed Juniper –flowering cones

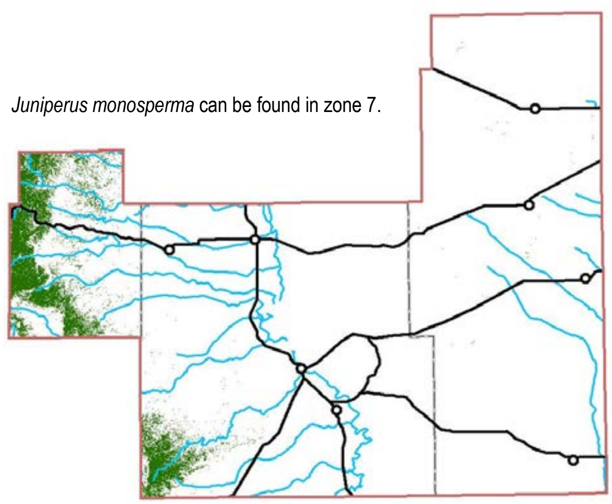
Oneseed Juniper –berries

Oneseed Juniper –berries

Archaeology: *Juniperus* has been found in 24 sites in the CFO region, with fruit, seeds, leaves, roots, twigs, and wood recovered. The use of this resource is more common in the Formative and Post Formative, with only one instance of wood use in the entire Archaic period. In comparison with mesquite this taxon is most likely of lessor economic importance.

Oneseed Juniper –bark

In the Lipan Origin Account (*Opler, Myths and Legends of the Lipan Apache*), the Lipan accurately documented the four juniper species found in the Guadalupe region and described three of the junipers as having “blue berries” and one as having “red berries”. There are still just four juniper species found in the Guadalupe range; three have blue berries and one has red berries.



Juniperus monosperma can be found in zone 7.

Juniperus pinchotii Sudw., (JUPI)

Pinchot’s Juniper

Tough scale leaves and cones, similar to *J. monosperma*, but cones are sweet, not resinous.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Fruit	x	x							x	x	x	x
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Also called Redberry Juniper. Shrubs or small trees to 6 m, usually multi-stemmed. Bark of trunk gray to brown, exfoliating in thin strips, bark of small branches smooth. Leaves scale-like, yellow-green, 1–2 mm long, not overlapping more than one-fifth their length. Seed cones mature in 1 year, ovoid, 6–8 mm, copper to copper-red, fleshy and sweet, not resinous, one seed. Seed 4–5 mm in diameter.

Phenology: Evergreen. Flowers with summer rains, as opposed to *J. monosperma*, which flowers in early spring.

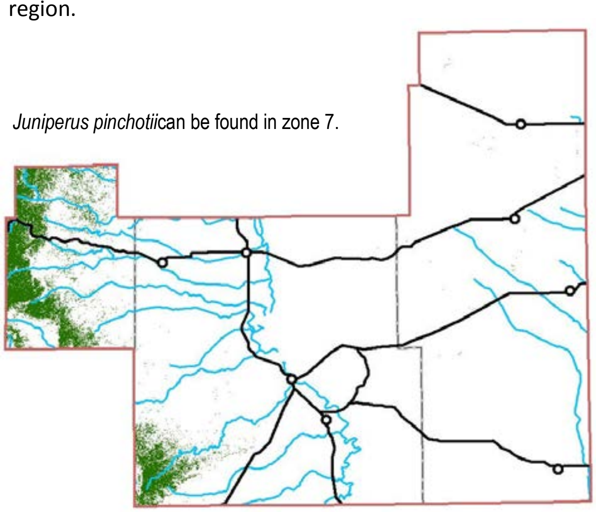
Habitat: At lower elevations and latitudes than *J. monosperma.* Scattered locations, often associated with eroding soils or gypsum.

Food: The cones, which look like berries, are sweet and edible. Lipan Apache cooked the cones with hot rocks in wooden bowl or boiled them in hot water (Opler 1935). (Mescalero) mixed with mescal and eaten (Castetter 1936, pg. 37). This juniper is also known as Red Berry juniper, due to its distinctive red berries. Even though it is not well documented in the ethnobotanical record, the fruits of this juniper are much sweeter and tastier than the other junipers found in the region.

Medicine: Comanche sprinkled dried leaves on a fire and inhaled the smoke for headaches, “ghost sickness,” and vertigo. A decoction of dried roots was also taken for menstrual complaints (Jones 1968).

Storage: The fruit would need to be processed immediately, the leaves and stems could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.



Pinchot’s Juniper

Pinchot’s Juniper –trunk

Pinchot’s Juniper –berry

Cyperaceae – Sedge

Yellow Nutsedge

These grass-like plants grow in wetlands and around stock tanks. Sedges (Cyperaceae) have triangular stems (sedges have edges) whereas rushes (Juncaceae) have round stems without the "knees" found on the grass stems.

Yellow Nutsedge –leaves and flowers

Yellow Nutsedge –flowers

Cyperus esculentus L. (CYES)
Yellow Nutsedge

A grass-like plant with three-angled stems.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x	x			
Root	x	x	x	x					x	x	x	x

Botanical Description: Perennial three-sided graminoid, spreads by underground roots and aboveground runners. Edible tubers. Stems 15–60 cm tall. Leaves 3–7, flat to V-shaped, 20–40 cm long by 2–4 mm wide. Flower spikes at end of stalk are grass-like, with four to five horizontal bracts, 5–30 cm long, 0.5–4 mm wide. Fruit one-seeded, brown, about 1.5 mm long and 0.5 mm wide, oblong with a rounded apex, tiny-dotted, often not maturing. Seeds yellowish brown to dark brown.

Phenology: Flowers summer to fall.

Habitat: On moist, fertile soil in swales and around stock tanks.

Similar Species: ***Cyperus squarrosus*** is much smaller in all respects. ***Cyperus retroflexus*** can be found in upland sandy areas.

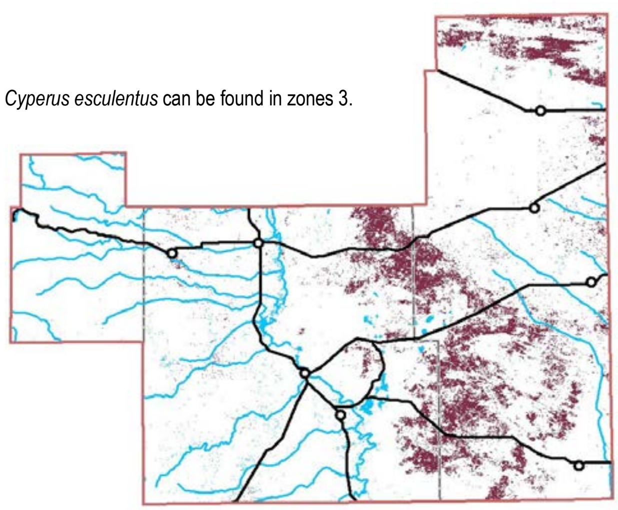
Fodder: Flowers salted and fed to horses, seeds salted and fed to horses (Castetter and Opler 1936).

Food: Stout rhizomes were eaten raw or peeled and cooked (Castetter and Opler 1936).

Storage: Seeds could be stored for several years, the rhizomes would need to be processed and eaten immediately.

Archaeology: One carbonized seed has been recovered from a site in the CFO region.

Cyperus esculentus can be found in zones 3.



Elaeagnus angustifolia L., (ELAN)
Russian Olive

A medium tree with silvery foliage, alternate leathery leaves, and (usually) thorns.
(Introduced, Invasive)

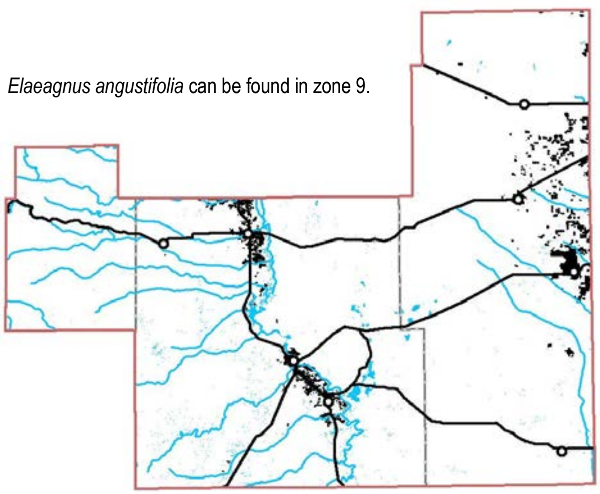
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x	x					
Fruit								x	x	x		

Botanical Description: Large shrub or small tree to 7 m tall, usually as wide as tall. Branches are silver, becoming shiny and brown with age, sometimes thorny. Leaves are alternate, dark green or silvery above, very silvery beneath, 4–10 cm long, 1.2–2.4 cm wide, lance-shaped. Flowers are solitary or in clusters of two to three near leaf base, silver on the outside, yellow inside, tubular, four-petals, fragrant. Fruit is a fleshy berry with a single seed at the center, yellow or silvery.

Phenology: Flowers spring-summer, berries ripen in the fall.

Habitat: Disturbed, moist places, along rivers. Introduced in the central and western U.S. by the early 1900's. Invasive and crowds out native species (USDA plant database).

Archaeology: This taxon has not been found in the CFO region, because it is a recent introduction.




Russian Olive


Russian Olive –leaves & flowers

Russian olive is non-native. It was introduced from central Asia for landscaping.


Russian Olive –fruit


Russian Olive –branch with thorns

Mormon Tea

Mormon Tea–stems and flowering cone


Mormon Tea–cone

Ephedra torreyana S. Watson (EPTO)

Mormon Tea, Torrey's jointfir

Iyáné bidąą' í (Mescalero Apache)

A medium shrub with no apparent leaves and gray-green stems.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x						
Seed					x	x	x					
Stem				x	x	x	x					
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Shrubs erect, 25–100 cm. Bark gray, cracked and irregularly fissured. Branches alternate or whorled, rigid, angled. Twigs blue-green becoming gray with age, internodes 2–5 cm. Male and female cones about 6 mm long on separate plants. Leaves in whorls of three, tiny 2–5 mm, clasping the stem. Pollen cones 1–4 at a node, ovoid,
6–8 mm, with cream to pale yellow bracts 2–4 mm long. Seeds 1–2, elliptical, 7–10 mm by 1.5–3 mm, light brown to yellow green, rough.

Phenology: Flowering cones appear April–June.

Habitat: Dry rocky to sandy areas, widely but thinly distributed; Chihuahuan Desert Scrub and sometimes Chihuahuan Semi-Desert Grassland.

Body Decoration – Charred stems were used by some tribes as tattoo needles.

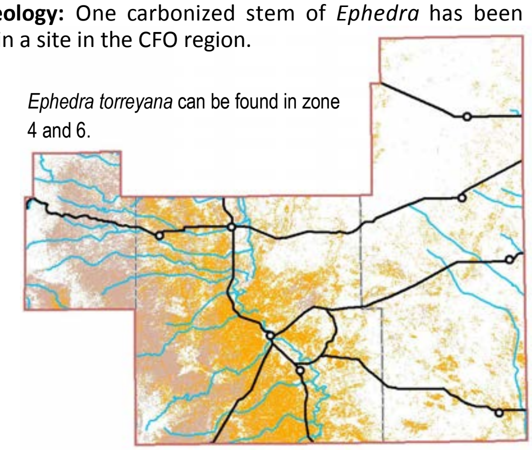
Drink: Ranchers also made a "health drink" tea (Warnock 1973).

Food: Seeds were roasted and eaten whole or ground into a flour for pinole (Tull 2013).

Medicine: *Ephedra* contains ephedrine and pseudoephedrine, which dilate blood vessels and raise the heart rate. These compounds are banned from modern sports due to their supposed performance-enhancing abilities. Our native plants contain very low levels of these compounds (Warnock 1973). Several groups, including the White Mountain Apache, made a tea from this plant to purify the body, especially for diarrhea, gonorrhea, and syphilis (Reagan 1928).

Storage: The dried seeds and stems could be stored for several years.

Archaeology: One carbonized stem of *Ephedra* has been found in a site in the CFO region.



Equisetum laevigatum A. Braun (EQLA)
Scouring Rush, Horsetail, Smooth Horsetail

A wetland plant with hollow rough stems.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Stem	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Annual stems arise from a perennial root network. Slender aerial stems grow up to 75 cm tall, simple or branched from base, without leaves. Each stem is ridged, hollow, composed of repeating segments that fit into each other. The segments are vertically ridged, and the nodes are marked by black rings. Flowers occur as seed cones at the tip of each stem.

Phenology: Grows spring–fall.

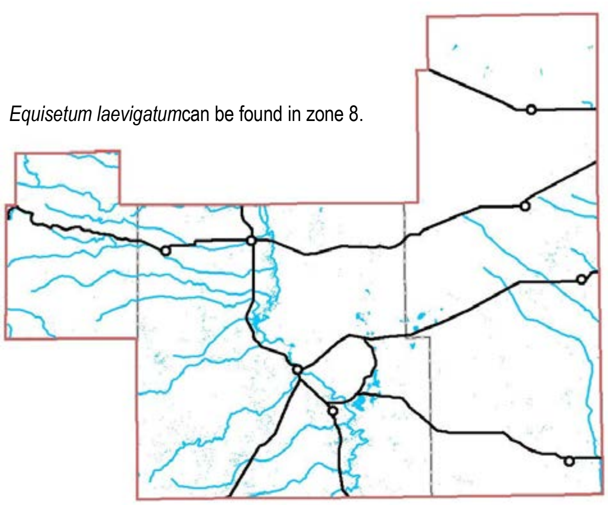
Habitat: Damp seeps, along streams, and at the bottom of canyons.

Medicine: A traditional remedy for kidney and bladder troubles including urinary problems, pain in the prostate gland, and to stop bed wetting. Extracts have also been used to treat arthritis, bleeding ulcers, tuberculosis, even treating wounds to stop bleeding. Its ability to stop bleeding makes it a popular treatment for nosebleeds and hemorrhoids (Moore 1995).

Other: Scouring rush is commonly used to polish wood and bows, scrub pots and pans, or for other cleaning purposes, due to its high content of silica phytolith crystals.

Storage: Dried stems could be stored for several years.

Archaeology: One carbonized stalk has been found in one undated site in the CFO region.

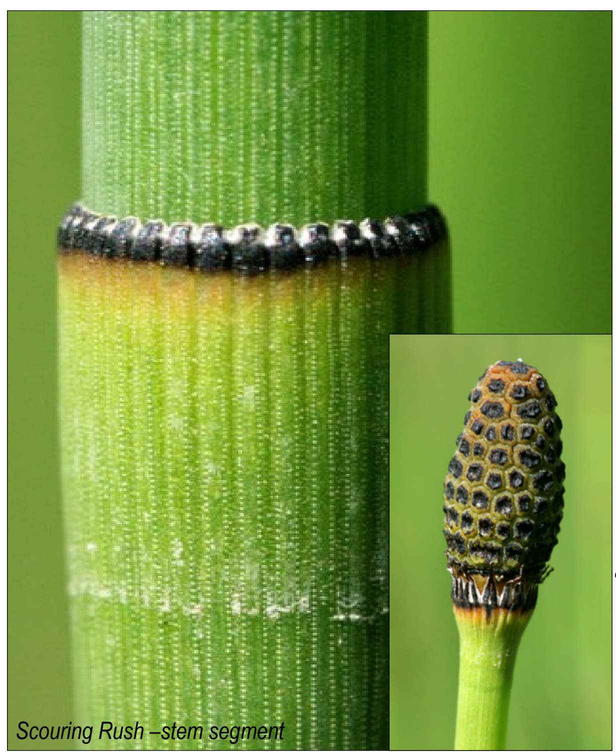


*Equisetum laevigatum*can be found in zone 8.

Scouring Rush

Scouring Rush

Other aquatic plants found only in or along water include *Lemna* (a floating single-celled plant) and *Marsilea* (water clover).



Scouring Rush –stem segment

Scouring Rush –seed cone

Natural spring in a canyon near the Pecos River; places like this were important as rest stops in prehistory.

Acalypha phleoides Cav. (ACPH3)
Shrubby Copperleaf

No milky sap.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x	x			

Botanical Description: Perennial forbs to 50 cm tall, erect, branching, densely covered with short recurved hairs. Leaves elliptic to almost round, 2–6 cm long, 1–3 cm wide, hairy on both surfaces, edges serrate. Flowers clustered in spikes at the end of the stems, 2.5–10 cm long, red. Petals absent, but with long red stamens. Fruit 2 mm long, 2.7 mm wide, hairy.

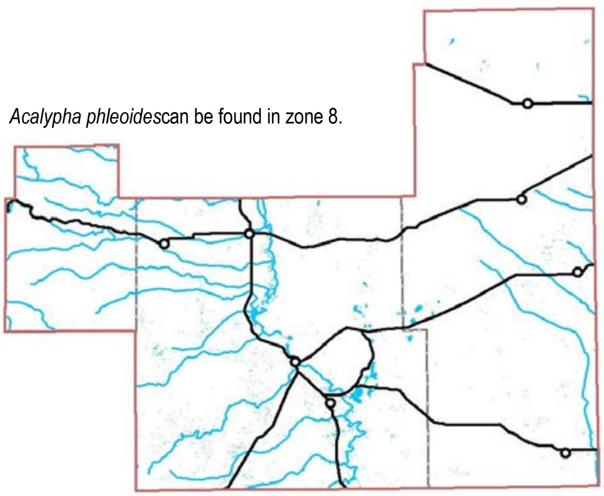
Phenology: Flowers May–September after rains.

Habitat: Uncommon. Foothills of the Guadalupe Mountains, along creeks.

No recorded uses.

Storage: Dried plant could be stored for several years.

Archaeology: *Acalypha* has been found once in the CFO region from one site in the Early Formative. It is probably of minor importance.



*Acalypha phleoides*can be found in zone 8.

Shrubby Copperleaf

Shrubby Copperleaf –flower

Shrubby Copperleaf –close-up flowers

Sandmat

Sandmat –leaf

Sandmat –seeds

Chamaesyce glyptosperma (Engelm.) Small (CHGL13) Sandmat

Milky sap.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x	x			
Stem								x	x	x	x	x

Botanical Description: A small annual, stems horizontal on the ground, smooth overall. Leaves opposite, flowers at the base of leaves. Flowers in a cup-shaped structure which encloses the male and female flowers.

Phenology: Flowers May–September after rains.

Habitat: Chihuahuan Semi-Desert Grassland, Chihuahuan Desert Scrub. Common.

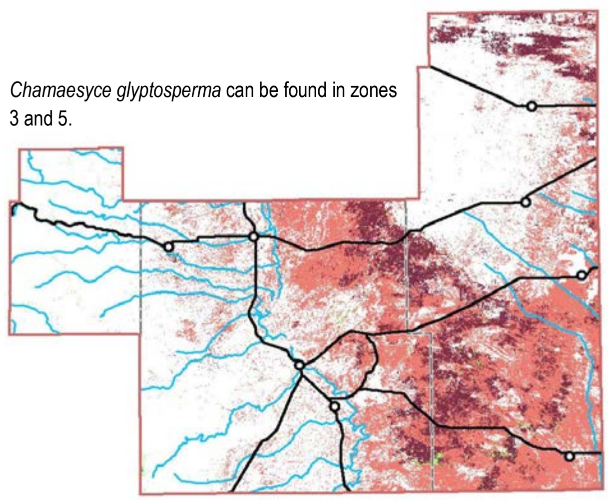
Similar Species: At least 16 species of *Chamaesyce* are found in the CFO region, and all are tiny and inconspicuous. Other similar species include ***Phyllanthus abnormis*****,** an annual, and ***Phyllanthus polygonoides*****,** a perennial with a woody base. Their green globular fruit hangs below the stems. They have been used to poison fish.

No recorded uses.

Storage: Dried plant could be stored for several years.

Archaeology: *Chamaesyce* has been found once in the CFO region from one site in the Late Formative. It is probably of minor importance.

Chamaesyce glyptosperma can be found in zones 3 and 5.



Croton pottsii
(Klotzsch) Müll. Arg.(CRPO5)
Croton

No milky sap.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Leaves			x	x	x	x	x	x	x	x	x	

Botanical Description: Perennial with long (0.5 to 1.5 times leaf length) leaf stalks. Usually less than 30 cm tall, not found with milky sap, but sometimes with watery latex. Leaves alternate, lance-shaped, less than 2.5 cm wide, with a dense covering of hairs that obscures the leaf surface. Flowers at the end of stems as well as where leaves join the stem. Fruit is a 3-seeded capsule.

Phenology: Flowers in the summer.

Habitat: Chihuahuan Semi-Desert Grassland, Chihuahuan Desert Scrub, Sandhill Shrubland. Common.

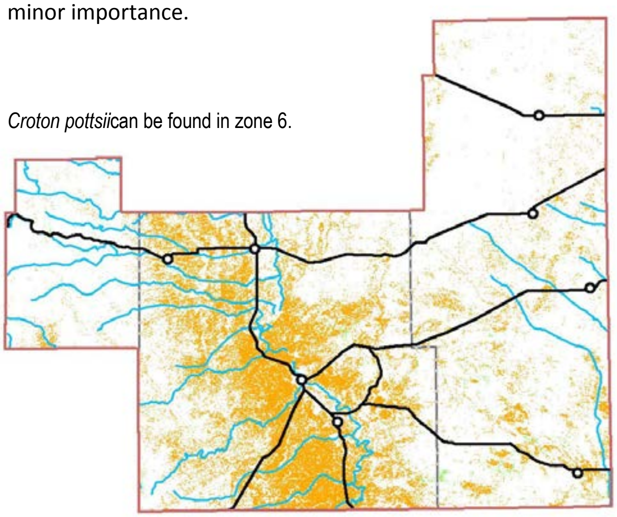
Similar Species: ***Croton dioicus*** is another perennial with short (less than 0.4 times leaf length) petioles. ***Croton glandulosus*** is annual, leaves toothed, with a whitish gland on each side of the midvein on lower surface. ***Croton texensis*** is annual, leaves evenly distributed, herbage greenish, lower stem glabrous. ***Croton lindheimerianus*** is annual, leaves clustered at stem tips, 2–8 cm long. ***Croton monanthogynus*** is annual, leaves clustered at stem tips, 1–2 cm long. Leaves of this sweet-smelling herb make a tasty tea. Other species of *Croton*, such as the more common *C. texensis*, are toxic and have been used as an insecticide.

Forage: Although croton species do not have many documented human uses, it is a primary forage species for dove, quail, and Lesser Prairie Chicken in the CFO region. Today, it is intentionally planted to help improve dove and quail habitats. In the past, areas with dense croton populations would have supported dove and quail populations, which were important small game birds to indigenous cultural groups in the CFO region.

Storage: Dried plant could be stored for several years.

Archaeology: *Croton* has been found twice in the CFO region from two sites in prehistoric contexts. It is probably of minor importance.

*Croton pottsii*can be found in zone 6.



Croton

Croton –leaves

Croton –flower

Croton –flower


Spurge


Spurge –leaves


Spurge –close-up of flower

Euphorbia davidii
Subils, (EUDA5)
Spurge

Milky sap.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				

Botanical Description: Perennial, plants erect. Flowers in a cup-shaped structure which encloses the male and female flowers. Leaves opposite or alternate, flowers at the end of the stems.

Phenology: Flowers summer.

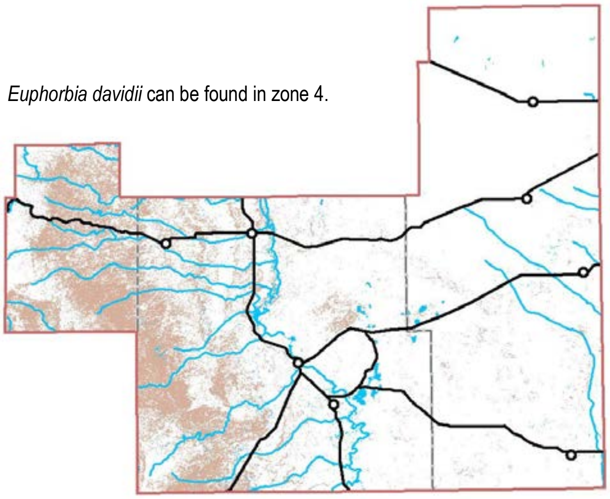
Habitat: Scattered locations in the foothills.

Medicine: *Euphorbia* species contain a toxic, acrid sap that may cause a rash or blistering. It has been used externally on warts. Sheep and goats are able to eat these plants without reacting.

Storage: Dried plant could be stored for several years.

Archaeology: *Euphorbia* has been found twice in the CFO region from two sites in prehistoric contexts. It is probably of minor importance.

Euphorbia davidii can be found in zone 4.




Spurge –flower

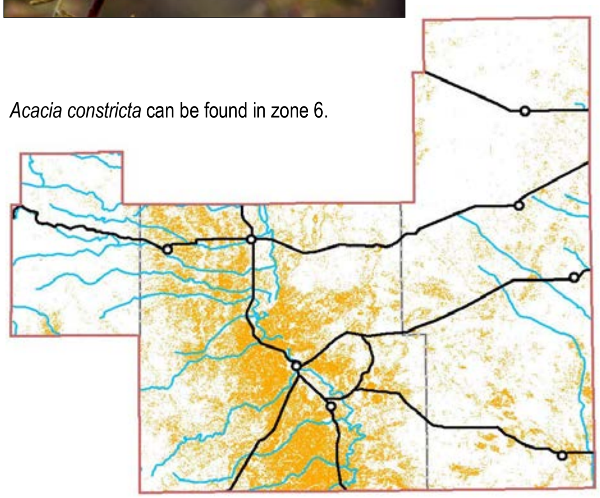
Excavating a bedrock mortar site on the banks of the Pecos River, this site was an important food processing location since the Archaic time period.

Whitethorn Acacia –branches

Whitethorn Acacia –flowers

Whitethorn Acacia –seed pods

Acacia constricta can be found in zone 6.



Vachellia constricta (Benth.) Seigler & Ebinger (VACO9)

Previously known as *Acacia constricta* Benth.

Whitethorn Acacia

Long, straight, white thorns and delicate compound leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x				
Seed	x	x	x						x	x	x	x
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Shrub to 4 m tall. Purplish branches have pairs of straight white spines. Leaves deciduous, alternate, compound with tiny leaflets. Flowers yellow in dense spherical heads. Fruits are a linear or slightly curved pod, strongly constricted between the seeds.

Phenology: Flowers May–August.

Habitat: Forms thickets on hillsides in Chihuahuan Desert Scrub.

Similar Species: ***Mimosa aculeaticarpa*** is a medium shrub, also with tiny compound leaflets, but it has curved thorns and cream-colored flowers. ***Acacia greggii*** is similar in stature to A. constricta but it has much larger leaflets, curved thorns, and cream flowers in spikes. ***Mimosa borealis*** is similar to A. greggi, but it has slightly smaller leaflets and flowers in pink to red ball-shaped clusters.

Food: *Acacia* seeds were used for food, but were not preferred compared to mesquite. The beans are toxic raw and must be processed via repeated cooking and leaching (Tull 2013).

Medicine: Michael Moore discusses *A. constricta* and *A. greggii* as interchangeable in use in his 1941 Medicinal Plants of the Desert and Canyon West. Medicinal uses for both species include: "Pods are used for conjunctivitis in the same manner as mesquite pods are used and the gum, although harder to harvest, is used in the same way as mesquite gum. The powdered pods and leaves make an excellent infused tea (2-4 ounces of the standard infusion every three hours) for diarrhea and dysentery, as well as a strongly astringent hemostatic and antimicrobial wash. The straight powder will stop superficial bleeding and can also be dusted into moist, chafed body folds and dusted on infants for diaper rash. It was widely used by Native Americans for treating the sore backs and flanks of their horses… The flowers and leaves as a simple tea are good anti-inflammatory for the stomach and esophagus in nausea, vomiting, and hangovers. It is distinctly sedative. The root is thick and mucilaginous as a tea and is good for sore throat and mouth inflammations as well as dry raspy coughing. " (Moore 1941, pg. 28).

Other: *Acacia* wood has been used around the world for construction and fuel.

Storage: Seeds could be stored for several years.

Archaeology: *Acacia* has been found in nine sites across the CFO region, with wood found at seven sites and single seeds obtained from two sites. Given that mesquite is so abundant in the CFO region, this species was most likely a minor economic species.

Senegalia greggii (A. Gray) Britton & Rose (SEGR4)

***Previously known as Acacia greggii* A. Gray (ACGR)**

Catclaw Acacia, Acacia, *Una de Gato*

Curved thorns like cat claws and rounded oval leaflets.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x				
Seed	x	x	x						x	x	x	x
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Shrub to 4 m tall. Branches have curved spines like cat claws. Leaves alternate, compound. Flowers cream-colored in dense elongate clusters. Fruit is a bean pod with folded round segments. Older individuals can grow almost as large as mesquite and have brown furrowed bark.

Similar species—See ***Acacia constrica***.

Phenology: Flowers May–August.

Habitat: Chihuahuan Desert Scrub and Chihuahuan Semi-Desert Grassland.

Food: A nutritious meal was made by some Native people from dried pods and seeds (Warnock 1974). The Cahuilla are reported to have eaten the pods fresh (Bean and Saubel 1972). Seeds are stored, roasted, ground and made into bread. Beans are used for food. (Russell 1908) Seeds were used as "starvation food" (Rea 1991) and used to feed domesticated animals. (Hinton 1975)."

Wood: Acacia is considered to be a great construction material and fine firewood (Bean and Saubel 1972). Split twigs were used as basket material and made into a brush to sweep off the metates or stone grinding mortar and pestles (Weber and Seaman 1985).

Medicine: **"***Pods are used for conjunctivitis in the same manner as mesquite pods are used and the gum, although harder to harvest, is used in the same way as mesquite gum. The powdered pods and leaves make an excellent infused tea (2-4 ounces of the standard infusion every three hours) for diarrhea and dysentery, as well as a strongly astringent hemostatic and antimicrobial wash. The straight powder will stop superficial bleeding and can also be dusted into moist, chafed body folds and dusted on infants for diaper rash. It was widely used by Native Americans for treating the sore backs and flanks of their horses. The flowers and leaves as a simple tea are good anti-inflammatory for the stomach and esophagus in nausea, vomiting, and hangovers. It is distinctly sedative. The root is thick and mucilaginous as a tea and is good for sore throat and mouth inflammations as well as dry raspy coughing."* (Moore 1941). *"The pod is powdered and applied moistened as a poultice for muscle pain, bruises, or sprains. It also is used for the same purposes as Mesquite."* (Moore 1990).

Storage: Seeds could be stored for several years.

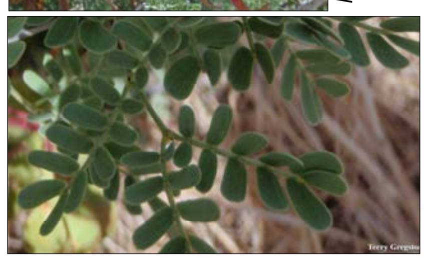
Archaeology: This taxon has not been found in the CFO region archaeologically.

Catclaw Acacia

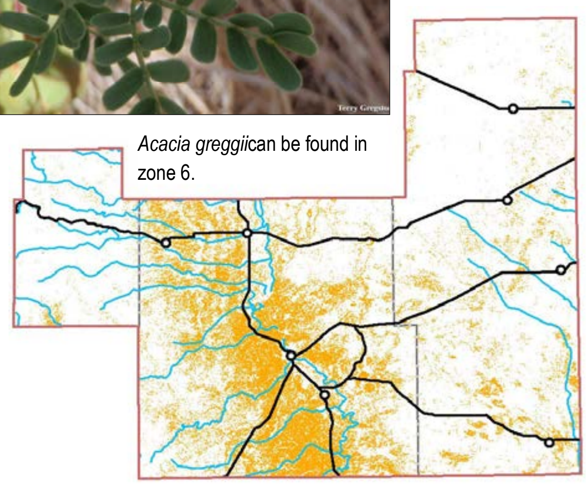
Catclaw Acacia –flower

seed pod

Catclaw Acacia –seed



leaves



*Acacia greggii*can be found in zone 6.

Astragalus mollissimus Torr. (ASMO7)
Milkvetch, Woolly Locoweed

Bushy gray-green herb with long compound leaves and showy spikes of purple flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x				
Leaves			x	x	x	x	x	x	x			

Botanical Description: Perennial herbs up to 80 cm tall. Leaves alternate, compound, gray with dense hairs, 15–35 leaflets. Leaves 2–28 cm long. Flower stalks of 7–20 pinkish purple pea flowers, sometimes with half white petals, each flower 6 to 12 mm long, hairy. Fruit is a densely hairy bean pod (legume), egg-shaped, 8 to 24 mm long.

Phenology: Blooms March–August.

Habitat: Grasslands and Chihuahuan Desert Scrub.

Similar Species: ***Sophora stenophylla*** is a medium-sized herb (~30 cm tall). It has compound leaves with nine narrow linear leaflets and blue-purple flowers in showy spikes.

No recorded uses.

Storage: Dried plant could be stored for several years.

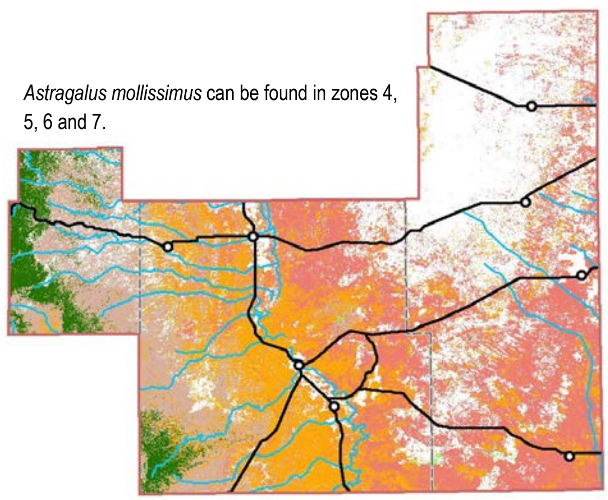
Archaeology: This taxon has not been found in the CFO region.

Milkvetch

Milkvetch –flowers

The plant contains an alkaloid, locoine, which causes livestock to "go loco" and can lead to death.
It can also contain poisonous amounts of selenium extracted from selenium-rich soils.

Milkvetch –flower



Astragalus mollissimus can be found in zones 4, 5, 6 and 7.

Milkvetch –leaves

Milkvetch –seed pods

Dalea formosa Torr. (DAFO)
Featherplume, Range ratany

A bush with tiny green leaves and pretty pink and yellow flowers from a fuzzy base.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x	x	x		
Leaves			x	x	x	x	x	x	x	x	x	
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Small shrub usually less than 1 m tall. Leaves are alternate along stem, compound, gland-dotted. Each leaflet is less than 3 mm long, and the entire leaves are usually less than 3 cm long. Flowers with purple and yellow petals (yellow petals deciduous first) in few-flowered spikes at the end of branches. Conspicuous hairy flower bases.

Phenology: Flowers May–October.

Habitat: Chihuahuan Desert Scrub, especially on gravelly hillsides.

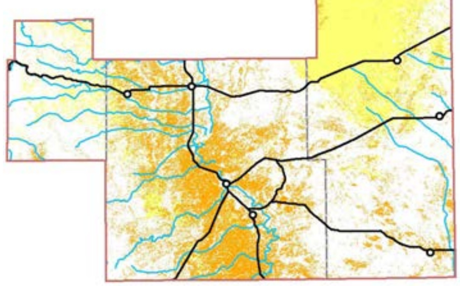
Similar Species: When not in flower this can be confused with *Condalia ericoides*, but *Dalea formosa* has compound leaves whereas *Condalia* has simple leaves. Also, the feathery plumes on the flowers can make this plant look like Apache plume (*Fallugia paradoxa*), a taller shrub in the Rose family with leaves not compound but hand-shaped. It is found along arroyos in Chihuahuan Desert Scrub and Chihuahuan Semi-Desert Grassland West of the Pecos River.

Medicine: (Pueblo and Apache) treatment for growing pains and aching bones. (Hopi) influenza and viral infections, considering it a "cold" herb for hot conditions. (New Mexican Spanish) strong bath made with branches, bath used to relieve arthritic pains (Moore 1989, pg 132).

Storage: Dried plant could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Dalea Formosa can be found in zones 1 and 6.



Featherplume –flowers

Featherplume

Featherplume

Featherplume –branches

Featherplume –flower

Purple Prairie Clover

Purple Prairie Clover –cone-like head

Purple Prairie Clover –flowers

Dalea purpurea Vent. (DAPU5)
Purple Prairie Clover

Small green leaves and purple flower spikes at the end of stalks.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Root			x	x	x	x	x	x	x	x	x	x

Botanical Description: 30–60 cm tall. Tiny purple flowers in dense, cone-like heads (2–5 cm long). Compound leaves with 3–5 narrow linear leaflets.

Phenology: Flowers summer.

Habitat: Great Plains Shortgrass Prairie, more common to the north and east.

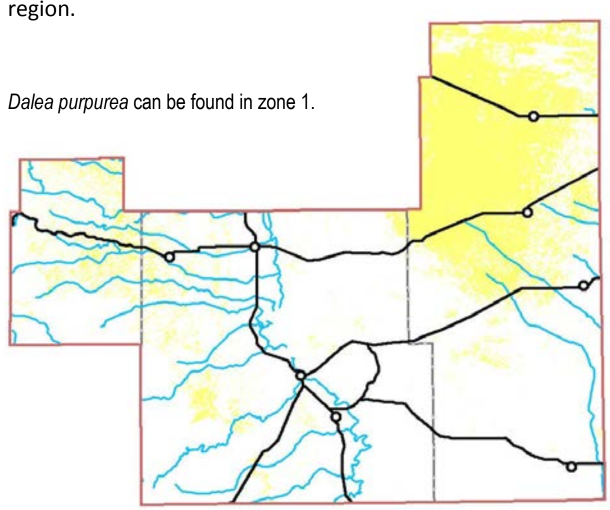
Similar Species: ***Dalea lanata*** has wooly-gray leaves growing along the ground in sandy areas. It has deep purple flowers. Its roots are very sweet when eaten raw and the seeds may be ground into flour (Warnock 1974). ***Dalea jamesii*** is a tiny herb with three wooly-gray leaflets and yellow fuzzy flowers. ***Dalea nana*** is a tiny herb with five leaflets and yellow flowers in small spikes.

Food: The sweet root is edible raw (Elpel 2004).

Medicine: The fresh plant induces vomiting, but a tea can be made from dried leaves (Elpel 2004).

Storage: Dried plant could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.



Dalea purpurea can be found in zone 1.

Hoffmannseggia glauca (Ortega) Eifert, (HOGL2)

Indian Rushpea, Hog Potato, Pig Nut

Compound leaves with closely packed leaflets, flowers large, yellow and orange.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x						
Root	x	x	x						x	x	x	x

Botanical Description: Rhizomatous perennial forb 10–20 cm tall, roots often tuberous. Leaves are compound with tiny leaflets, without dots. Flowers in an erect spike 5–15 cm tall, yellow dotted with red glands. Fruits are a bean 1.5–4 cm long. Seeds are somewhat kidney-shaped, hard and smooth.

Phenology: Flowers April–June.

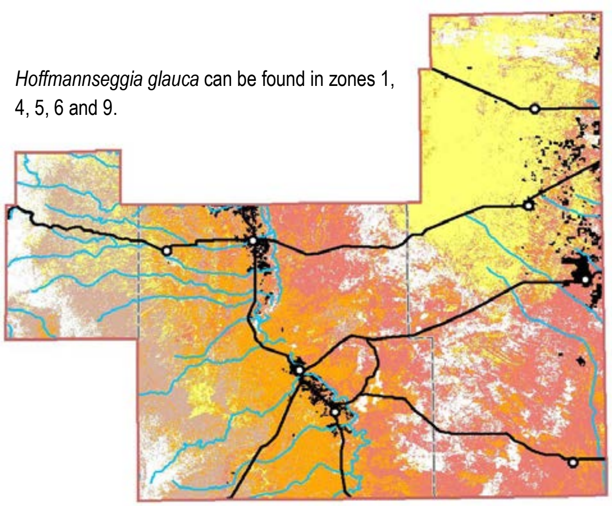
Habitat: Widespread in dry flats and along roadsides.

Similar Species: ***Caesalpinia (Pomaria) jamesii*** is very similar but has gland dots on underside of leaves.

Food: The "potato" was roasted and eaten. At the time of his visit to the Mescalero Apache, Castetter noted that this plant was not extensively used anymore (Castetter 1935).

Storage: Dried plant could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.



Hoffmannseggia glauca can be found in zones 1, 4, 5, 6 and 9.

Indian Rushpea –flower

Indian Rushpea

Did You Know? Other legumes also have an edible root "potato." ***Apios americana*** (Indian potato or groundnut vine) was widely eaten by native peoples East of the Mississippi and is becoming popular in home gardens as an easy-to-grow perennial vegetable.

Indian Rushpea

Indian Rushpea –tubers


Honey Mesquite


Honey Mesquite –branches


Honey Mesquite – flower


Honey Mesquite – seeds

Prosopis glandulosa Torr., (PRGL2)
Honey Mesquite
*Mezquite de miel (*Spanish)
Nanstą̨né (Mescalero Apache)

A small tree with long compound leaves and bean pods drooping from the branches

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x	x	x	
Fruit								x	x	x	x	x
Leaves					x	x	x	x	x	x		
Root	x	x	x	x	x	x	x	x	x	x	x	x
Seed	x	x	x					x	x	x	x	x
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Shrub or tree 6–9 m tall, wider than tall, with many-forked trunks and branches. Forms deep taproots, often many times larger and deeper than the trunks. Branches droop with feathery leaves. Twigs armed with pairs of sharp thorns up to 5 cm long. Leaves compound, deciduous. Flowers tiny, numerous on spikes, pale yellow-green. Fruits are straight beans, slightly flattened and with slight constrictions between the seeds, yellow fading to tan. A sweet mesocarp fills the spaces between the seeds.

Phenology: Flowers from March to November with adequate moisture, pods mature in the fall and can be collected for several months afterward as they dry.

Habitat: Mesquite can occur in all habitat types in the southern half of New Mexico, although it is rare in deep sand portions of Sandhill Shrubland and on the drier limestone hillsides of Chihuahuan Desert Scrub.

Beverage: Pods boiled then strained or allowed to ferment (Castetter and Opler 1936).

Ceremonial*:* The flour could be mixed with water to make a drink, or mixed with other plant foods, and this drink would be offered to those participating in the ritual which attending the making of an infant's cradle, constituting a "little feast" (Basehart 1960).

Food: Pods consists of 25% sugar, pounded or ground, hand-kneaded and made into a jam or pudding (Moermon 2012). Immature **beans** were pounded, used as a vegetable, pods used for food or flour or used in pancakes (Moermon 2012). Beans were ground into a meal and made into a sort of bread (Castetter 1935). **Seeds** ground into a flour, used in breads and cakes (Basehart 1960) or boiled and in most cases the beans were squeezed in a strainer, often made from a bison stomach, to produce a kind of gravy, which could be drunk (Basehart 1960) and prepared as mush.

Human Utilization: The beans were usually collected by three to four women and collected off the ground (Castetter and Opler 1936; Bell and Castetter, 1937).

Medicine: Juice from **leaves** mashed and strained and used for irritated eyes, a pediatric aid used for stomach aches, and a urinary aid (Basehart 1960). **Pods** soaked in water and used for earache (Basehart 1960); urinary aid – infusion of bark used for children with enuresis (Basehart 1960). Also used as a wound dressing (Curtin 1949).

Prosopis glandulosa Torr., (PRGL2)
Honey Mesquite
***Mezquite de miel (*Spanish)**
***Nanstą̨né* (Mescalero Apache)**
.... continued

Pima woman pounding mesquite pods, Pierce 1904

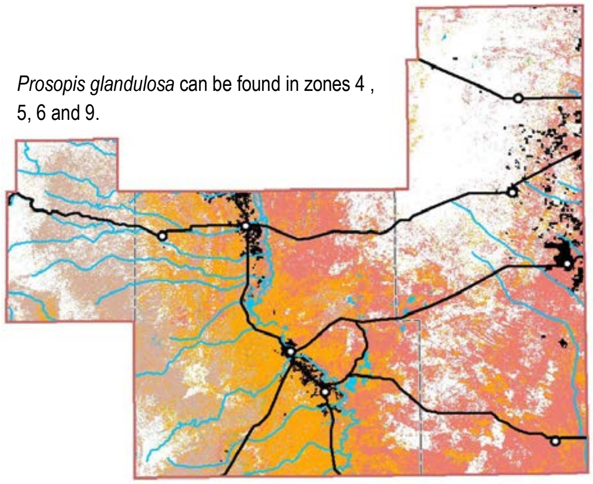
Weapons*:* Mesquite resin was used for fletching arrows (Basehart 1960).

Storage: Dried pods and other plant parts could be stored for several years.

Archaeology: Charred mesquite remains are found in almost all archaeological sites in Southeastern New Mexico, including wood fragments, pods, beans, leaves, and thorns. The first half of the recent New Mexico saying, "one digs for wood, and climbs for water," is inspired by the thick and dense roots of the mesquite. As the most ubiquitous woody species in the region, mesquite can be found in most samples that have wood charcoal. In the Permian Basin region and the CFO region in general mesquite grows as a short shrub, with few plants becoming large trees. However the distribution of mesquite today is probably more widespread than in the past. Mesquite wood has been found in 84% of all sites in the CFO region, while only 15 sites have mesquite pod or seed remains. This finding shows the power of differential preservation, and how the different ways plants are used affects the probability of preservation and recovery. Mesquite wood is intended to be burned, while only accidents cause pods and seeds to be burned. Whitehead (2015) found that 80% of the recovered wood fragments from the Biting Ant site complex were from a *Prosopis* species, with pods and beans (+300 fragments) recovered in charred pit features (Middle and Late Archaic contexts). In the Permian Basin sites we find that mesquite wood is the dominant taxon of all wood types by count and ubiquity, with a slight drop-off in the Post Formative, where *Juniperus* wood becomes co-equal in ubiquity. Mesquite was probably as important as the mescal agave to prehistoric populations.

Honey Mesquite –seed pods

Prosopis glandulosa can be found in zones 4 , 5, 6 and 9.



Did you know?

There are at least six types of mesquite in North America: *Prosopis chilensis* (algarrobo); *P. glandulosa* and *P. glandulosa* var. *glandulosa* (honey mesquite); *P. glandulosa* var. *torreyana* (western honey mesquite); *Prosopis pubescens* (screwbean mesquite); and *Prosopis velutina* (velvet mesquite). Pods of honey mesquite can be boiled in water yielding a molasses, are a good source of calcium, manganese, iron, and zinc, and contain 40% protein.

Slimflower Scurfpea

Slimflower Scurfpea –leaves

Slimflower Scurfpea –flowers

Psoralidium tenuiflorum (Pursh) Rydb. (PSTE5)
Slimflower Scurfpea

Leaves with three leaflets, showy purple flowers in open spikes.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x					
Leaves				x	x	x	x	x	x	x	x	
Stem	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Tall and branched. Leaves mostly trifoliate or 5-foliate and glandular dotted. Flower is white-lavender. Flowers 5–11 mm long, in loose racemes or small axillary clusters. Herbage smooth. Flowers bluish or purplish, fruits ovoid, tapering to the beak. Leaflets slightly wider than linear.

Phenology: Flowers from late spring to mid summer, May–July.

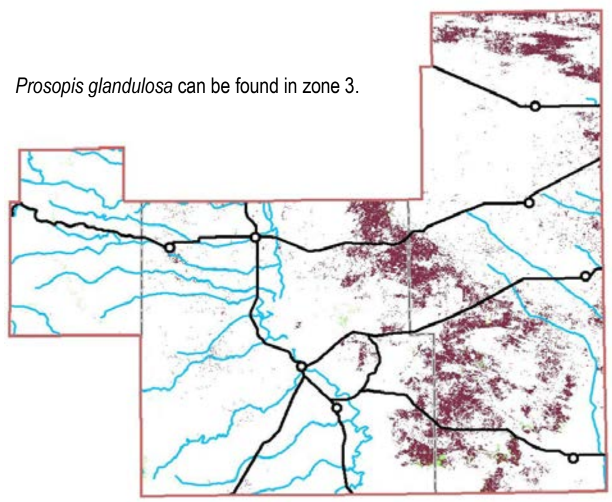
Habitat: Sandhill Shrubland.

Use: This plant is poisonous, but looks similar to Indian breadroot (***Pediomelum esculentum***), which has an edible root and grows throughout the north- central Great Plains.

Storage: Dried plant could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Prosopis glandulosa can be found in zone 3.



Slimflower Scurfpea

Senna bauhinioides (A. Gray) Irwin & Barneby (SEBA3)
Twinleaf Senna

Two-paired leaflets and yellow flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x				
Leaves			x	x	x	x	x	x	x	x		

Botanical Description: A spreading low plant with gray-green foliage. Flowers yellow, frequently only partly open. Fruit a plump pod. Leaves are paired.

Phenology: Flowers from late spring to summer, May–August.

Habitat: Sandhill Shrubland, other sandy areas, widespread.

Similar Species: ***Senna roemeriana*** is very similar but has leaves more than 2.5 times as long as wide. It is also common, blooming later.

Medicine: Senna is a powerful laxative and is still used as a common ingredient in over-the-counter laxatives.

Storage: Dried plant could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

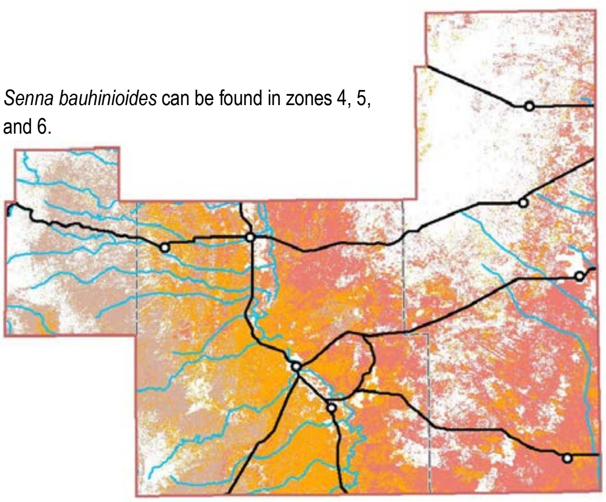
Twinleaf Senna

Twinleaf Senna –flower

Twinleaf Senna –pod

Twinleaf Senna –seeds

Senna bauhinioides can be found in zones 4, 5, and 6.



Twinleaf Senna—leaf

Sophora secundiflora (Ortega) Lag. ex DC. (SOSE3) (=*Dermatophyllum secundiflorum*) Mountain Laurel, Mescalbean

Large round leaflets, large bean pods with red seeds.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x					
Seed							x	x	x			

Botanical Description: Medium shrub or small tree up to 8 m tall. Evergreen dark green leaves. Large purple spikes of flowers, strongly aromatic. Tough woody bean pod with hard, bright red seeds.

Phenology: Flowers early spring, and sometimes following monsoons in the fall.

Habitat: Foothills of the Guadalupe Mountains.

Ceremonial: All plant parts are toxic. Red mescalbeans are poisonous but were used in rituals and as ornamentation. Effects of eating the beans include muscle paralysis, nausea, evacuation of the bowels, seeing red, unconsciousness, and death (Hatfield 1977). During historical times, a "mescalbean society" spread among many Indian peoples far beyond the natural range of *Sophora*, as far as Algonquian-speaking groups. This society differed from group to group, but usually limited membership to men, and consumed mescalbeans as part of a ceremony. The Mescalero Apache may have mixed the seeds with tulbai (corn beer) (Castetter and Opler 1936). It is unclear to what extent the Mescalbean society in Lipan culture is today or in the past, but the Lipan utilized (and still utilize today) the mescalbean for artifact decoration and necklaces. Most prized are the yellow mescal beans, which are much more rare and alternated in adornments with the red.

Ornamentation: Many groups used mescalbeans in clothing and adornment but did not maintain a mescalbean society. For example, the Western Apache decorated shirts, leggings, bags, necklaces, dresses, warrior dolls, and medicine bags.

Storage: Dried plant could be stored for several years.

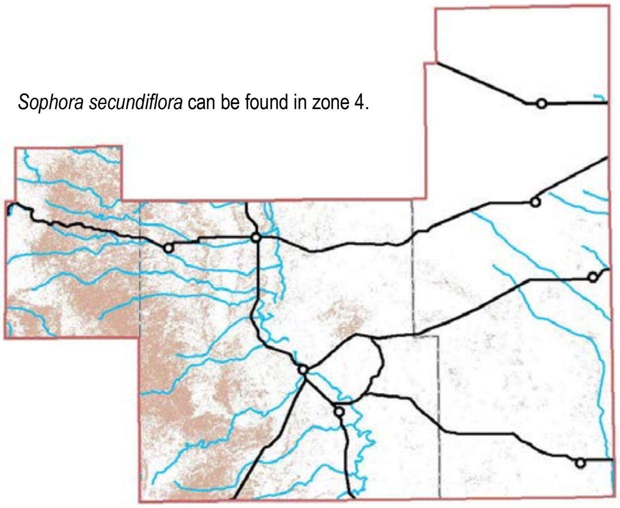
Archaeology: This taxon has not been found in the CFO region.


Mountain Laurel

Mountain Laurel –Seed Pods


Mountain Laurel –seeds

Mountain Laurel –flowers



Vicia ludoviciana Nutt. (VILU)
Louisiana vetch

Small green compound leaves with small solitary purple to white flowers at the base. of the leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x	x	x				
Seed									x	x	x	

Botanical Description: Inconspicuous twining herb. Leaves compound with about six linear leaflets. Flowers arise singly along the stem from the base of leaves.

Phenology: Flowers from April–August.

Habitat: Sandhill Shrubland, occasional.

Similar Species: Most other vines are in the Asclepiadaceae, Cucurbitaceae, or Convolvulaceae, but the most common vine in sandy areas is ***Epixiphium wislizeni,*** balloonbush, in the *Scrophulariaceae*.

Uses: The seeds and young stems are reported edible, but may contain cyanide (Elpel 2004).

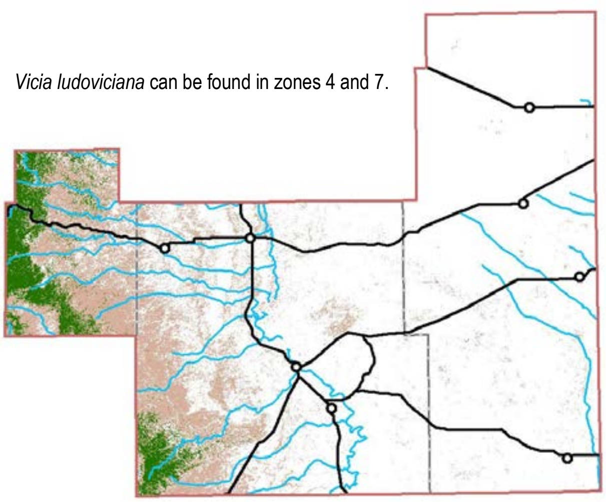
Storage: Dried plant could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.


Louisiana vetch


Louisiana vetch –flower

Vicia ludoviciana can be found in zones 4 and 7.



Louisiana vetch –seed


Louisiana vetch –pod

Gambel Oak

Quercus gambelii Nutt., (QUGA)
Gambel Oak
Ichích'ile (Mescalero Apache)

A shrub or small tree of the mountains, with leaves lobed more than halfway to the midrib.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x							
Leaves								x	x	x	x	x
Acorn								x	x	x		
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Archaeology: Unfortunately the morphology of *Quercus* wood is not distinct enough at the species level to distinguish this taxon below the genus level. *Quercus* wood has been found in 39 sites, and of the ones with dating associated with remains, the majority are in the Early Formative (14 sites), with six sites in the Late Archaic, and four in the Late Formative. Acorn caps have been found in three sites: two in the Early Formative and one in the Late Formative (which does not necessarily indicate acorn nut use, but could show burning as part of fuel use). Acorns were found at the Merchant Site (LA 43414) (Permian Quarterly Volume 2 number 1, March 2014). *Quercus* is interpreted as being an important wood supplement in the fuel economy and an important wood for tools and structures.

Botanical Description: A shrub or small tree up to 12 m high, deciduous, clumped or spreading. Bark light gray, young twigs thinly gray-hairy, becoming smooth with age. Leaves with 2–4 lobes per side, 4–17 cm long, 3–12 cm wide, about 1.2–1.9 times as long as wide, thinly hairy. Flowers green, tiny in spikes, inconspicuous. Acorns 1.8–2.7 cm long, solitary or clustered.

Phenology: Acorns form from August–October during good years.

Habitat: Ponderosa forests in mountains above 1,520 m.

Food: The raw or slightly roasted nuts are an excellent source of carbohydrate and fat. They were pounded and mixed with meat and stored in hide containers. Bark was used to make hominy by the Lipan Apache (Opler 1935).

Tanning: Oaks are an important source of tannic acid for tanning animal hides.

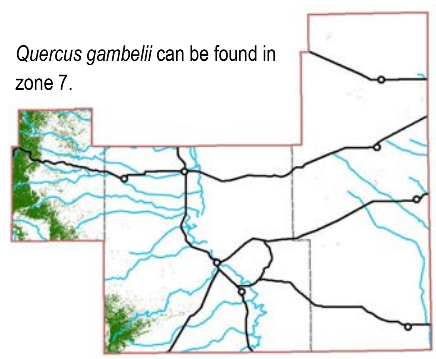
Medicine: Acorns were eaten by some Native people to increase sexual potency and as a reproductive aid, including for postpartum pain and to help in delivery of placenta (Castetter 1935). They have also been used as a cathartic to assist in vomiting (Vestal 1952).

Wood: Oak wood is prized for its strength and was preferred for use as a fire stick, to makes bows, and as tipi pegs (Opler 1935).

Storage: Dried seeds could be stored for several years.

Gambel Oak –leaves

Gambel Oak –leaves and acorns



Gambel Oak –bark

Quercus havardii Rydb., (QUHA3)
Havard Oak, Shinnery Oak

A low-growing shrub with oak leaves, found on sandy soils.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x							
Seed							x	x	x			

Botanical Description: Low deciduous shrub forming extensive colonies. Leaves green becoming brownish with age, eventually falling in winter. Leaves thick and hard, edges undulating with two to three rounded teeth on each side, undersides are grayish or yellowish with minute hairs. Flowers in short spikes, greenish. Acorns solitary or paired, 1.5–3.0 cm long.

Phenology: Flowers in spring, nuts ripen late summer-fall.

Habitat: Widespread throughout the region, especially on sandy soils in Sandhill Shrublands.

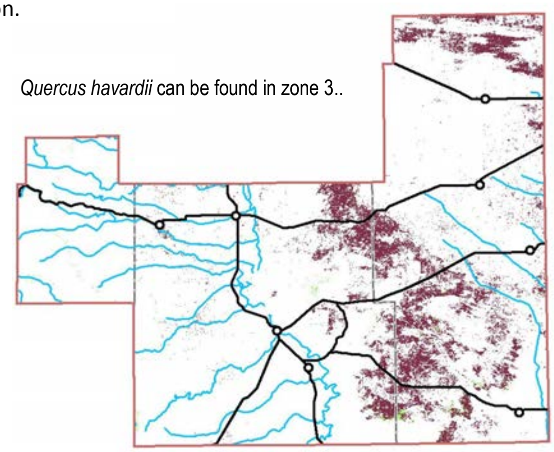
Other species: *Quercus grisea,* gray oak, is a larger shrub or small tree up to 10 m tall, with leaves simple, oval, small, and yellow-gray on the underside. It grows above 1,200 m in the foothills and mountains. Its acorns are edible raw or prepared, and shaved root chips were used as a spice to flavor drinks (Moerman 1998).

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.


Havard Oak


Havard Oak on sand dunes


Quercus havardii can be found in zone 3..


Havard Oak


Havard Oak –acorns


Havard Oak –leaves

Ocotillo

Ocotillo—branch with young leaves

Ocotillo—flower and fruit

Ocotillo—flower

Fouquieria splendens Engelm. *(*FOSP2)
Ocotillo

Spindly desert plant, only with leaves after rain.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Fruit							x	x	x			
Seed								x	x	x	x	
Branch	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Shrub or small tree with long branches 2–6 m high. Branches are spined and distinctly striped. Leaves 1–2 cm long, 2–8 mm wide, oblong. Flowers bright orange, trumpet-shaped, 1–2 cm long, 2–8 mm wide, at the tips of branches. Fruit a 3-valved capsule.

Phenology: Leaves and flowers appear following rains.

Habitat: Chihuahuan Desert Thornscrub, on rocky hillsides and foothills, almost exclusively west of the Pecos River.

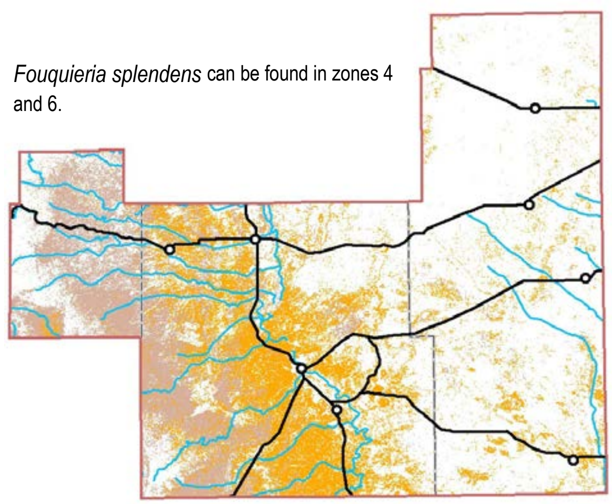
Similar Species: This species is sometimes confused with cacti such as Tree Cholla (***Cylindropuntia imbriacata***) but cacti never have leaves.

Food: Native peoples throughout the Southwest have eaten the flowers and fruit raw or processed into sweets. Ocotillo flowers were used to make refreshing drinks and the seeds were ground to make a flour. The strong-yet-flexible branches were widely used in construction of temporary field camps (Castetter and Underhill 1935). A wax exuded from the stems was used for waxing leather and waterproofing (Tull 2013).

Medicine: Bark used to treat hemorrhoids, frequent need to urinate, varicose veins, and piles. Cahuilla used the tea for painful, moist coughing in the aged. The Apaches took baths in and drank root tea for fatigue and swollen, tired limbs (Moore 1941).

Wood: Branches used in fences and corrals; Lipan Apache used to make wickiup frames(Opler 1935).

Archaeology: This taxon has not been found in the CFO region.



Fouquieria splendens can be found in zones 4 and 6.

Phacelia popei Torr. & A. Gray (PHPO)
Scorpion Weed, Pope’s Phacelia

A purple-flowered plant with glandular, smelly hairs.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x				

Botanical Description: Annual forb with pretty purple flowers, less than 30 cm tall, hairs glandular, often covered with sand. Leaves divided into lobes all the way to the midvein. Flowers in dense uncoiling spikes, each flower more than 4 mm long.

Phenology: One of the first plants to flower in spring continues through summer.

Habitat: Disturbed areas, roadsides, Mesquite Scrub.

Similar Species: ***Phacelia integrifolia*** is a similar early bloomer, but more robust, usually 30 cm tall, with wavy-edged leaves. ***Nama hispidum*** also has showy purple flowers, but it has smaller linear leaves and flowers not in “scorpion-tail” coiled spikes.

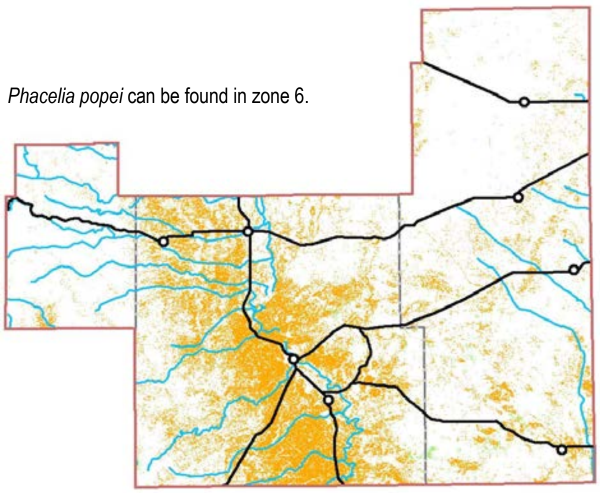
No recorded uses; toxic: Some people are allergic to compounds in the hairs and can develop a severe rash reminiscent of a reaction to poison oak.

Storage: The dried plant could be stored for several years.

Archaeology: This taxon was not found in the CFO region.


Scorpion Weed

The *Hydrophyllaceae* are herbs with stiff hairs. Leaves are always alternate and stipules absent. Flowers are bell-shaped, with 5 united petals, blue or purple. This family is closely related to the *Boraginaceae*.




Scorpion Weed


Scorpion Weed –leaf


Scorpion Weed –flower

Spotted Beebalm was used to treat fevers, insomnia, stomach ailments and diarrhea.

Juglans major (Torr.) A. Heller, (JUMA)
Arizona Walnut

Growing in mountains and foothills, riparian, often found with nuts lying around the base.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Bark									x	x	x	
Flower				x	x							
Fruit									x	x	x	
Nuts									x	x	x	
Seed									x	x	x	

Botanical Description: Trees 5–18 m tall. Leaves 18–38 cm long, compound. Leaflets 9–15, serrate and tapering to their tips. Flowers in erect or hanging spikes, whitish or greenish. Fruits have a fibrous, slightly fleshy husk surrounding a nut 1.8–2.8 cm in diameter. Seed is single, two-lobed: a walnut.

Phenology: Flowers April–May, nuts ripen in the fall.

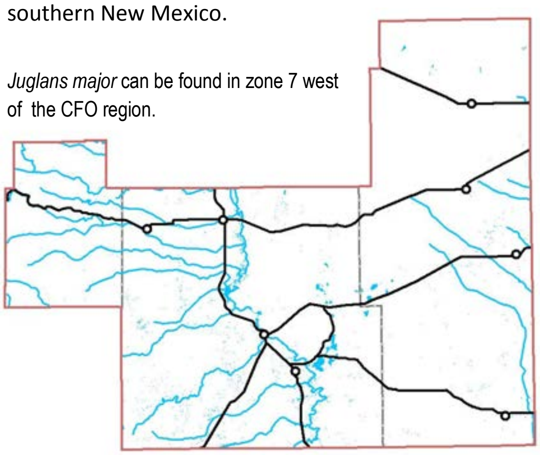
Habitat: Along streams and rocky canyons in the foothills and mountains.

Construction: Bark fibers from late in the season were used to make dome-shaped lodges when traveling (Moermon 1998).

Food: Walnuts ripen in September, when they were gathered and pounded with clubs to remove the hulls and then washed. The nuts are rich in fat. Nutmeats were mixed with mesquite gravy or ground and combined with roasted agave or maize and stored for winter (Castetter and Opler 1936). They can also be mixed with banana yucca, sotol, or mesquite (Castetter and Opler 1936). Walnuts, cracked and whole, charred and uncharred, are common in rockshelters. Western Apache parched the nuts before grinding them (Buskirk 1986).

Paint: The outer shell coverings were soaked in water to make black paint (Castetter and Opler 1936). The dye can also be used to make ink.

Other species: ***Juglans microcarpa***, Texas walnut, grows in similar areas but has thinner leaflets. ***Carya illinoinensis***, pecan, is a large deciduous tree cultivated along the Pecos River valley. Leaves 30–45 cm long, compound. Leaflets 9–17, 5–12 cm long and 2–6 cm wide. Flowering spikes green, long, hanging. Fruits are dark brown, ovoid, breaking open. Nuts are pecans. Pecan is the official state tree of Texas. It is native to East Texas and widely cultivated in West Texas and southern New Mexico.



Juglans major can be found in zone 7 west of the CFO region.

Arizona Walnut –leaves

Arizona Walnut – leaves and flower

Storage: The nuts can be stored for at least one year.

Archaeology: One carbonized nutshell fragment has been recovered in the CFO region. This family of plants is considered of minor economic use.

Western Apache gave walnut juice to dogs for worms, and today walnut is used for detoxing humans as well.

Broken nut after removing husk


Arctic Rush


Arctic Rush –stem


Arctic Rush –flower


Arctic Rush –flower

Juncus arcticus Willd. (JUAR2)
Arctic Rush

A round-stemmed grass-like plant with no leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x	x		
Root	x	x	x						x	x	x	x

Botanical Description: Perennial graminoid spreading by roots. Stems round, erect, 20–100 cm tall, 1–3 mm diameter. Leaf blades usually absent. Flower emerges from the side of the stem in a group of three-to-many, chestnut brown. Seeds dark amber, oblong, 0.6–0.89 mm.

Phenology: Flowers summer to fall.

Habitat: On moist, fertile soil in swales and around stock tanks.

Similar Species: ***Eleocharis palustris*** is also round-stemmed, but has a spike of flowers at the top of the stem, rather than emerging from the side of the stem as in *J. arcticus*. It is in the Cyperaceae.

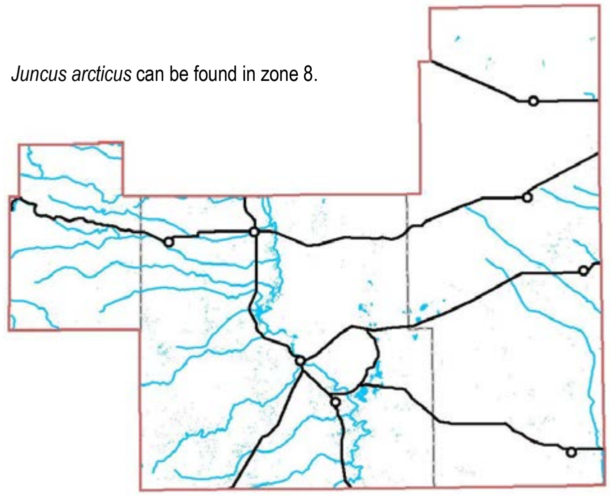
Fodder: Flowers salted and fed to horses, seeds salted and fed to horses (Castetter and Opler 1936).

Food: Tubers eaten raw or peeled and cooked (Castetter and Opler 1936).

Storage: Tubers and stalks would have limited storage capacity.

Archaeology: This taxon has not been found in archaeological samples in the CFO region.

Juncus arcticus can be found in zone 8.



Koeberlinia spinosa Zucc. (KOSPa)

Crown of Thorns

Smooth, spine-tipped green stems, no leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x	x	x		

Botanical Description: Shrubs or small trees 0.5–10 m tall, leafless, stems and branches green, thorn-tipped. Flower bunches 3–15 mm, greenish white and cream-colored. Fruits is a spherical berry 3–5 mm, reddish turning dark purple. Seeds 3–3.5 mm, two to four per berry.

Phenology: Flowers May–October.

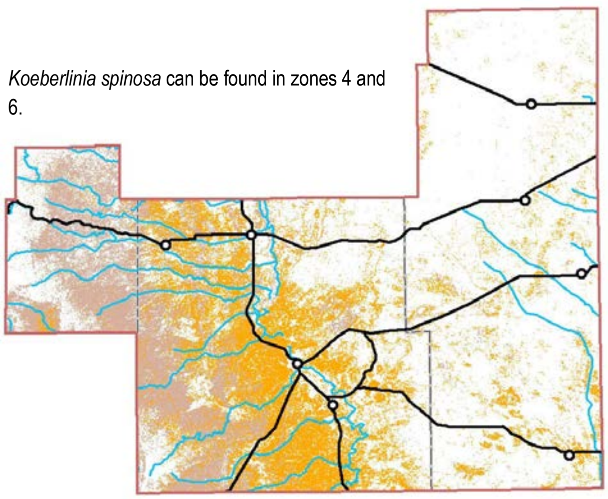
Habitat: Rocky soils throughout Chihuahuan Desert Scrub and Chihuahuan Semi-Desert grassland.

Medicine: Used as a traditional medicine in Mexico for diarrhea and disorders of the intestines and stomach (González 1984).

Storage: The stems of this plant could be stored indefinitely if stored properly

Archaeology: This taxon has not been found in the CFO region.

Koeberlinia spinosa can be found in zones 4 and 6.



Crown of Thorns –berries

Crown of Thorns

Crown of Thorns

Crown of Thorns –flower bunches

Crown of Thorns –flower

Littleleaf Ratany

Littleleaf Ratany –branches

Littleleaf Ratany –flower buds

Littleleaf Ratany – fruit

Krameria erecta Willd. ex Schult. (KRER)
Littleleaf Ratany

Small shrub with spine-tipped branches, tan-gray bark, and *alternate* leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x	x		
Root	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Shrub with many spikey branches up to 1 m high. Branches gray. Leaves alternate, linear, 1–12 mm long, 0.5–2 mm wide. Flowers solitary at the base of leaves or in spikes at the end of branches 5–12 mm long. Flowers with five bright pink or magenta petals with greenish-yellow center. The lowermost petal is keeled like a pea flower. Fruits are white, heart-shaped, inflated, 6 mm wide, with prominent red, barbed spines. Seeds are spherical, gray-brown, smooth.

Phenology: Flowers March–October.

Habitat: Mesquite Upland Scrub, Chihuahuan Semi-Desert Grassland, and Mixed Desert Thornscrub.

Similar Species: ***Krameria lanceolata*** is a perennial herb sprawling over the ground. The flowers and fruits are similar to *K. erecta* but the growth form is distinct. It is often found in Chihuahuan Semi-Desert Grassland.

Medicine: Ratany root can be used as an astringent and topical hemostat. The tea can also be used to decrease internal bleeding, but may cause constipation (Moore 1989, pg. 97-99). (Pima) Poultice of powdered root applied to sores.(Russell 1908, pg 80).

Dye: (Papago) Roots peeled, cut, split, boiled and used as a red dye for cotton, buckskins and garments (Castetter and Underhill 1935, pg. 48, 60, 69).

Storage: If stored properly the roots could be stored for many years.

Archaeology: This taxon has not been found in the CFO region.

Littleleaf Ratany –flower

Krameria erecta can be found in zones 5 and 6.

Hedeoma nana (Torr.) Briq. (HENA)
Dwarf Pennyroyal
Tł 'u hnłchį (Mescalero Apache)

A small plant with purple flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x						
Leaves			x	x	x	x	x	x	x	x		

Botanical Description: Plants 10–25 cm tall. Stem branched from base, hairy. Leaves along lower halves of stems, flowers on upper halves. Leaves 3–10 mm long, 2–4.5 mm wide with pointed tips, covered in fine hairs, sometimes purple tinged, not toothed. Flowers 3–5 per cluster, each 8–9 mm long. Pink with purple stripes.

Phenology: Flowers April–June.

Habitat: Rocky outcrops of limestone, Chihuahuan Desert Scrub.

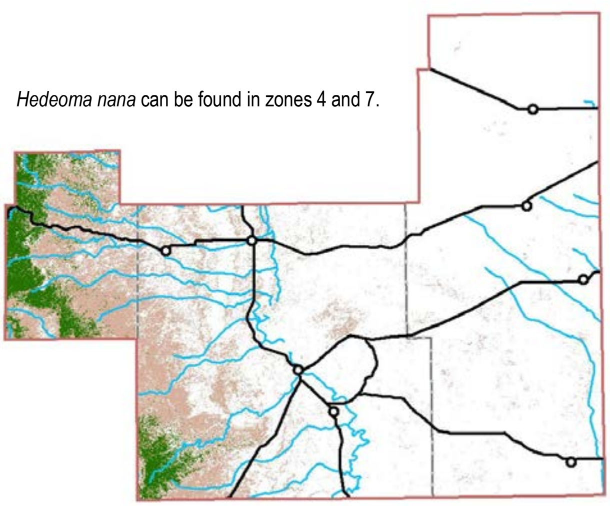
Similar Species: ***H. drummondii*** is widespread wherever juniper grows. Its flowers get narrower from a wide base, almost closing off the floral tube. ***H. plicata*** grows in canyons in the Guadalupe Mountains and has obviously toothed elliptical leaves. ***H. costata* var. *pulchella*** grows in similar habitats and also has toothed leaves, but its leaves are oval.

Medicine: Pennyroyal is used to help diminish stomach distension and related bloating by dilating the stomach vasculature, sending more blood to the area; it also helps with nausea (Kane 2011). It is a good mild sedative, for colds, flu, and fever, used to clear the liver, lungs, and assist the female reproductive organs, for nervous tension, and used as a mosquito repellent (Tierra 1998). It is also used as a physic for ceremonial dances (Train et al. 1941).

Spice: Young stems and leaves are boiled to make one of the best wild teas. Leaves have a mint flavor and were used as a spice, or leaves were chewed for mint flavor (Moerman 1998). The tea is also used as insect repellant. Pregnant women should avoid this plant (Tull 2013).

Storage: Dried leaves could be stored for many years.

Archaeology: This taxon has not been found in the CFO region.


Hedeoma nana can be found in zones 4 and 7.


Dwarf Pennyroyal


Dwarf Pennyroyal –flower


Dwarf Pennyroyal –leaf

Horehound

Marrubium vulgare L., (MAVU)

Horehound

A weedy plant with wooly hairs and rough, oval leaves (Introduced).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x	x		
Leaves			x	x	x	x	x	x	x	x	x	

Botanical Description: Perennial herbs with glandular, wooly hairs, stems 10–100 cm tall. Leaves rough, broadly oval, 1.5–5 cm long and wide, toothed edges. Flowers 3–6 mm long, white. Seeds are 2 mm long, black and bumpy.

Phenology: Flowers March to October.

Habitat: Along roads and disturbed cattle tanks, old home sites.

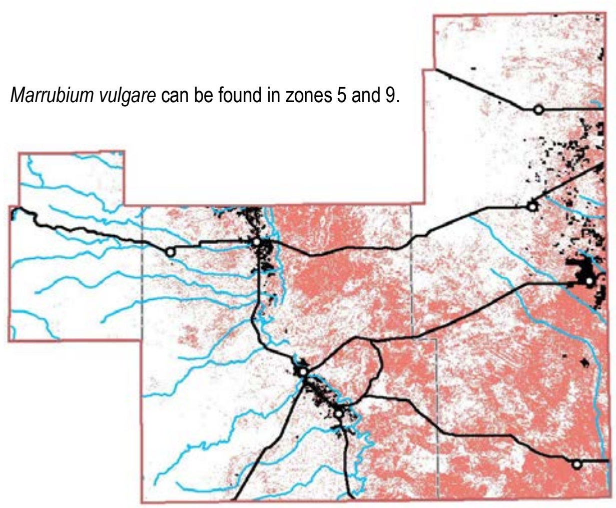
Medicine: A digestive aid, cough suppressant and expectorant, often added to cough syrups. Horehound candy has been popular in the past.

Storage: Dried leaves could be stored for many years.

Archaeology: This taxon has not been found in the CFO region.

Horehound was introduced from Europe for medicinal uses and as flavoring for horehound candy.

Marrubium vulgare can be found in zones 5 and 9.



Horehound –leaves

Horehound –flower

Mentha arvensis L. (MEAR4)
Canadian Mint
Often smelled before seen,
a mint-smelling plant growing in wetlands.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x	x		
Leaves				x	x	x	x	x	x	x	x	

Botanical Description: Perennial from rhizomes, aromatic, stem 10–50 cm tall, with short hairs. Leaves opposite, 1.5–5 cm long, toothed edges. Flowers in clusters at the base of the leaves, 4–7 mm long, white, pink, or violet. Fruit of four nutlets, oblong, smooth.

Phenology: Flowers July–October.

Habitat: Moist areas at higher elevations, especially springs, seeps, and along small creeks.

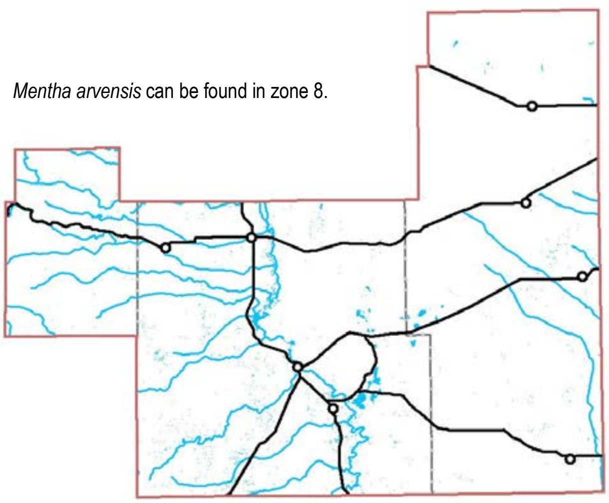
Medicine: Mint is the main source of menthol, used in many products to relieve nasal congestion and aid digestion.

Storage: Dried leaves could be stored for many years.

Archaeology: This taxon has not been found in the CFO region.


Canadian Mint

Mentha arvensis can be found in zone 8.




Canadian Mint -seed


Canadian Mint –flower

Monarda punctata L. (MOPU)
Spotted Beebalm

Large white-dusted leaves whorled around flower clusters.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x			
Leaves					x	x	x	x	x	x	x	

Botanical Description: Erect perennial, 15–90 cm tall, forms clumps. Leaves are toothed, 7 cm long, thyme-scented. Clusters of purple-spotted tubular yellow flowers form a dense elongate spike at the end of the stem. Flowers are surrounded by large whitish or purple-tinged leaves.

Phenology: Flowers June through September.

Habitat: Sandy soils; Sandy Plains Semi-Desert Grassland and Sandhill Shrubland.

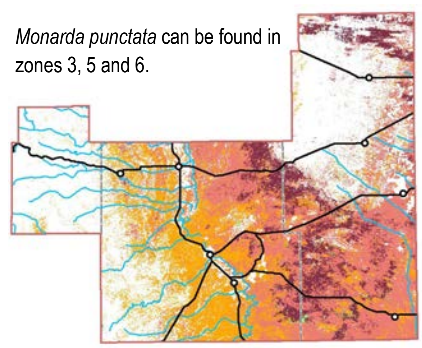
Beverage: Leaves and stems boiled to make a non-intoxicating beverage.

Medicine: Contains antiseptic thymol. Traditionally used as tea to treat fevers and to help sleep (Tull 2013). *Monarda* is also used for stomach ailments, as a nervine (Meyer 1976), and to help with diarrhea (Moore 1997).

Spice – Leaves were used as flavoring. Native people ground the leaves and mixed them with sausage for seasoning (Warnock 1974).

Storage: Dried leaves could be stored for many years.

Archaeology: This taxon has not been found archaeologically in the CFO region.



Monarda punctata can be found in zones 3, 5 and 6.

Beebalm contains thymol, an antiseptic and fungicide also found in thyme (another Mint Family plant).

Spotted Beebalm

Spotted Beebalm –flowers

Spotted Beebalm –seeds

Spotted Beebalm –flowers

Spotted Beebalm – dried flower heads

Poliomintha incana (Torr.) A. Gray (POIN3)
Hoary Rosemarymint,
Frosted Mint

Aromatic bush with fuzzy white hairs covering leaves and stems.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x	x			
Leaves				x	x	x	x	x	x	x	x	

Botanical Description: Perennial aromatic shrub. Leaves opposite, dark green, covered in dense white hairs, 1–3 cm long. Up to 100 cm tall. Flowers white-lavender with fuzzy bases. Fruits dry, splitting into four one-seeded nutlets.

Phenology: Blooms throughout growing season.

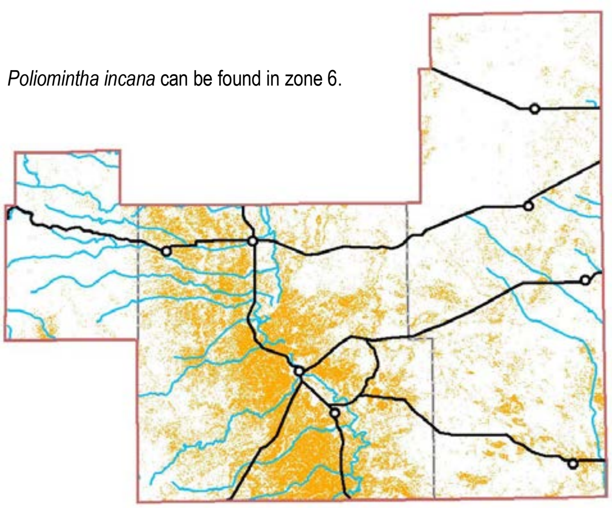
Habitat: Uncommon. Sandy areas, Chihuahuan Semi-Desert Grassland, sometimes associated with gypsum outcrops.

Uses: The Hopi used this mint raw or boiled as a seasoning (Whiting 1939). Tewa used the plant as medicine, flavoring, and as food (eaten raw or boiled) (Colton 1974). Comanche used it to increase the efficacy of other medicine plants (Jones 1968). Used by the Plains Apache as ritual/medicinal plant. Since this plant does not grow in Oklahoma, it is assumed that the Plains Apache obtained access to the plant through trade. (Jordan et al. 2006).

Storage: Dried leaves could be stored for many years.

Archaeology: This taxon has not been found in the CFO region.

Poliomintha incana can be found in zone 6.



Hoary Rosemarymint –seeds

Hoary Rosemarymint

Hoary Rosemarymint –flower

Hoary Rosemarymint –flowers

Drummond's Skullcap

Drummond's Skullcap–flower

Drummond's Skullcap –fruit capsules

Scutellaria drummondii Benth. (SCDR2)
Drummond's Skullcap

A small plant with purple/blue flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x	x	x	x			
Root					x	x	x	x	x	x	x	x

Botanical Description: 15–30 cm tall. Often branched at base, forming clumps. Leaves opposite, densely arranged, small, fuzzy, oval, 1–2cm long. Flowers form from base of leaves, blue-violet to lavender, 2–3 cm long.

Phenology: Blooms repeatedly throughout growing season.

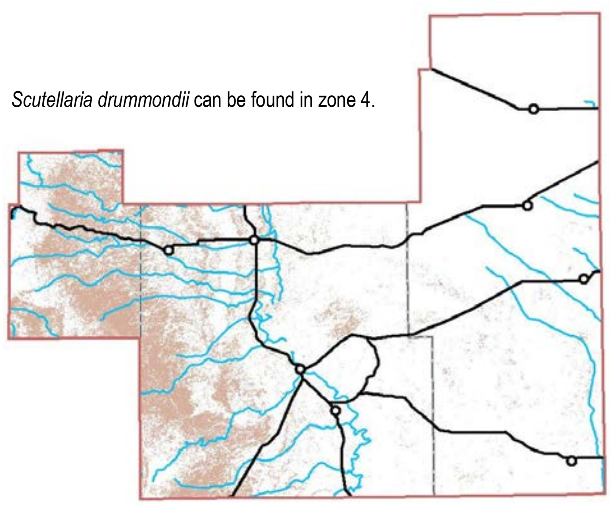
Habitat: Grassy plains, lower mountain slopes.

Medicine: This plant was used by some Native peoples to help menstrual cycles and stimulate the reproductive system, to relieve stress by supporting the nervous system, to help insomnia, hypertension, anxiety, and restlessness, as an anti-inflammatory, as a treatment for epilepsy, and to help throat infections, headache, pain, and convulsions. Pregnant women should not take skullcap.

Storage: Dried leaves could be stored for many years.

Archaeology: This taxon has not been found in the CFO region.

Scutellaria drummondii can be found in zone 4.



Allium drummondii Regel (ALDR)
Geyer's Onion

Looks and smells like a small onion.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x						
Root					x	x	x	x	x	x	x	x

Botanical Description: Smells like onion. Bulbs 1–5, ovoid, about 1 cm diameter, outer coat brown, net-like and fibrous. Leaves persistent, 2–5, sheathing. Leaf blades solid, flat, channeled 10–30 cm long and 1–3 mm wide. Stalk solitary, 10–30 cm tall by 1–3 mm in diameter. Flower clusters with 10–25 flowers at end of stalk, with one-lined bracts at base of cluster. Each flower is bell-shaped, 6–9 mm, six distinct white to pink petals.

Phenology: Flowers March–June.

Habitat: Mesquite grasslands, usually on finer-textured soils. Often growing in large colonies.

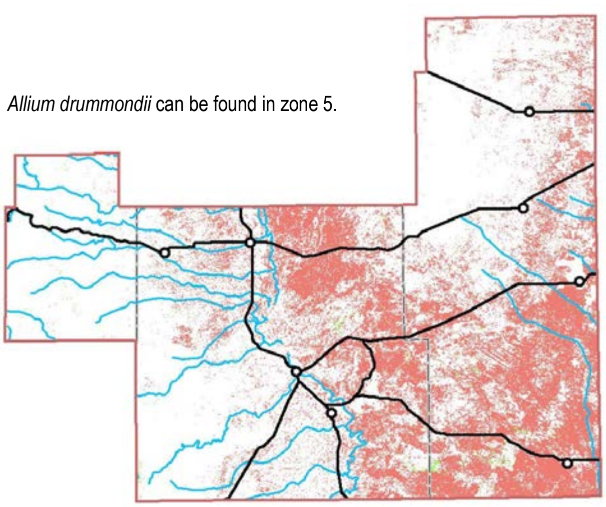
Similar Species: ***Allium perdulce*** is very similar, but the bracts around the flower heads have two to five lines.

Food – Eaten raw as a vegetable (Castetter 1935). Dried in the sun and stored to use in flavoring soups (Opler 1935). May have been an important seasonal food source and staple. Onions tend to grow in colonies, and some tribes are reported to have traveled long distanced to collect from a favorite patch (Tull 2013). Harvested in bulk and baked in earth ovens. Onions contain large amounts of indigestible starch (e.g., inulin) that must be exposed to heat for long periods to make edible. Baking in underground pits is the most widespread technique used for foods of this type.

Medicine – Onions are high in vitamin C and contain natural antiseptic compounds, making them ideal for treating common illnesses.

Storage: Dried leaves could be stored for many years, corms would be storable for at least as season before processing.

Archaeology: This taxon has not been found in the CFO region.



Allium drummondii can be found in zone 5.

Geyer's Onion

Onions, garlic, chives, and leeks are all cultivars derived from *Allium* species. Wild onions, although often much stronger than cultivated varieties, were used to flavor meat, soups, and gravies. For example, Western Apaches boiled blood in a deer stomach with onions for flavoring (Buskirk 1986).

Geyer's Onion – flowers

Sotol


Sotol -flowering stalks

Dasylirion leiophyllum Engelm. ex Trel (DALE2) Sotol, Green Sotol *Kuu gish kuu 'sade* (Mescalero Apache)

Leaves have spiny margins like *Agave* but are long and flexible.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x					
Root					x	x	x	x	x	x	x	x

Botanical Description: Large shrubs, sometimes with short trunks. Leaves bright green, shiny, stiff but flexible, with backward-pointing prickles. Up to 100 cm long by 2–3 cm wide. Flowering stalks tall, 2–5 m, yellow fading to tan flowers are thickly grouped along stalk.

Phenology: Flowering June–July.

Habitat: Occurs in Chihuahuan Desert Scrub and Chihuahuan Semi-Desert Grassland in the foothills of the Guadalupe Mountains.

Similar Species: *Dasylirion wheeleri* occurs to the west of the region and can be distinguished by whitish or bluish green waxy-glaucous leaves with forward-pointing prickles.

Ceremonial: Stalks used in the headdress of Mountain Spirit dancers (Basehart 1960).

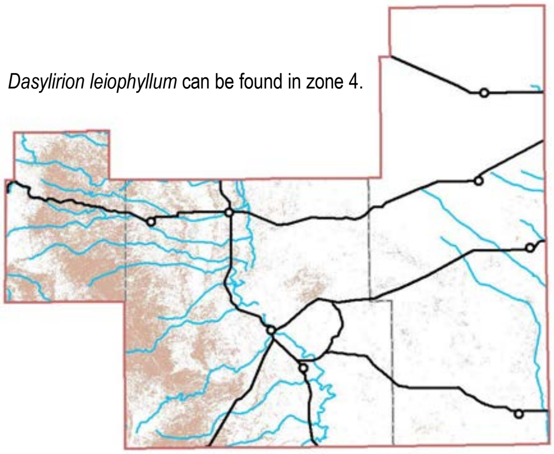
Food: A staple food of the Apache. The hearts of sotol were gathered when flowering stalks begin to emerge. They were prepared the same way as mescal and baked in underground pits for the same amount of time (Castetter and Opler 1936).

Tools: Stalks dried, split, drilled to make small pits and used as fire-drill hearths. Stalks and leaf base tissues were also used to make cigarette papers (Basehart 1960).

Storage: Processed hearts could be stored for at least a season if stored properly.

Archaeology: *Dasylirion* has not been identified in archaeological sites in the CFO district to date. However remains of this plant have been found outside the CFO in rockshelters and open air sites.

When the Chiricauhua harvested this plant, they would strip the stalk of seeds and plant them in the surrounding area to ensure a future generation of the plant.


Dasylirion leiophyllum can be found in zone 4.

Nolina microcarpa I.M. Johnst. (NOMI2)

Beargrass, Sacahuista

Etl'udeitsa (Mescalero Apache)

Looks like a large, tufted grass.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x							
Root					x	x	x	x	x	x	x	x

Botanical Description: Looks like a large tufted grass with wiry, lax, concave leaves 80–130 cm long and about 1 cm wide. Leaf edges are serrate with close-set teeth. Inflorescence 40–120 cm long (surpassing leaves), with thin rigid branches ascending. Bracts deciduous. Flowers white. Fruit capsules thin-walled, inflated: approximately 5 by 6 mm. Seeds loose in capsules.

Phenology: Flowering mid-to-late spring.

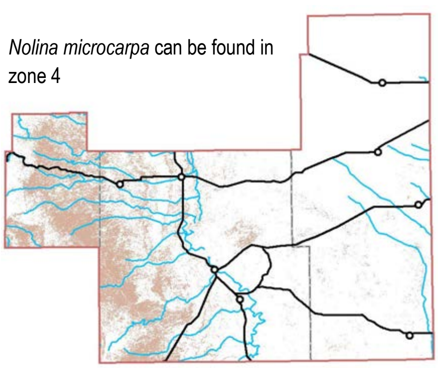
Habitat: Guadalupe Mountains and foothills, Chihuahuan Semi-Desert Grassland.

Similar Species: Distinguished from other very similar *Nolina* taxa (*N. micrantha, N. texana*) in the Guadalupe Mountain foothills by deciduous bracts of the inflorescence, which much exceeds the leaves. *Nolina micrantha* has persistent flower bracts, not exceeding leaves, overall purple and sparse, with slender branches. It flowers late spring to early summer. *Nolina texana* has persistent flower bracts, not exceeding leaves, overall not purple, dense, with thick branches. It flowers late winter through early spring.

Construction: Beargrass was used as tepee ground covering (Basehart 1974).

Container: Moist grass was laid onto hot stones to prevent steam from escaping (Castetter and Opler 1936). The new leaves were collected (from interior of plant) throughout the spring and summer (Kane 2011). The tough and flexible fibers were used for weaving and basketry. Dried leaves were fashioned into trays for use in processing yucca and mescal (Moermon 1998).

Food: The immature flower stalks were roasted for half an hour, peeled, and eaten, or they were boiled, dried, and stored to be used as vegetable (Castetter 1935; Castetter and Opler 1936). The hearts of these plants are not edible like mescal or stool.



Medicine: Although no documentation was found for SE NM ethnobotanical use as medicine, beargrass decoctions have been used for lung hemorrhages and pneumonia and to reduce swellings (Jones 1935). A salve or ointment from the root or the leaf was used to help with spider veins, edema, and even rheumatoid arthritis (Kane 2011). The stem was considered the best source of soap (Buskirk 1986).

Storage: The processed and dried flower stalks could be stored for several years.

Archaeology: No known archaeological occurrences.


Beargrass


Beargrass –Inflorescence


Beargrass –flower

Texas False Garlic

The Lily Family has linear leaves with parallel veins and regular flowers with three or six petals.
In addition to onions, asparagus is another well-known edible plant traditionally included in this family. Newer taxonomies have split the Lily Family to make separate families for agaves (Agaveaceae), onions (Alliaceae), and asparagus (Asparagaceae).

Texas False Garlic –flower

Nothoscordum texanum M.E. Jones (NOTE2) Texas False Garlic

Looks like an onion, but without the onion smell.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x	x	x	x
Root					x	x	x	x	x	x	x	x

Botanical Description: Perennial herb with a bulb 1–1.5 cm diameter. Stems solitary, 20–40 cm tall by 1–3 mm wide. Leaves 1–4, sheaths enveloping neck of bulb, 10–30 cm long by 1–4 mm wide. Flower cluster at end of stem with 3–6 flowers, 1–3 cm in diameter, with two persistent bracts. Flowers on 2- to 5-cm-long stalks, not fragrant, white-yellow, tepals 6, each 10–12 mm long by 3–4.5 mm wide. Fruit a 3-lobed capsule, 6–8 mm in diameter, with four to seven black seeds per chamber.

Phenology: Flowers March–December.

Habitat: Wetland edges.

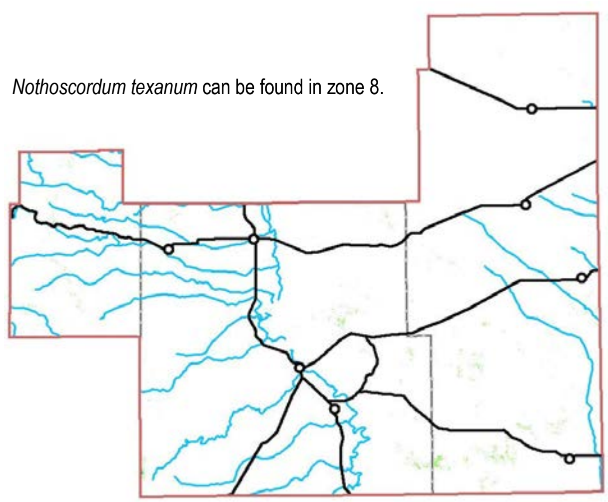
Similar Species: ***Zephyranthes longifolia*** is another small onion with no odor. It has a single large yellow flower at the end of each stem, and is found growing in sandy or gravely plains.

Use: No cultural use has been documented, probably because the small bulbs are the size of rice grains and this plant only grows in isolated wetlands. Tull (2013) lists this as a toxic plant and notes that it can have a musky odor.

Storage: Limited storage capacity.

Archaeology: This taxon has not been found in the CFO region.

Nothoscordum texanum can be found in zone 8.



Linum aristatum Engelm. (LIAR3)
Flax

Thin, wispy stems, small leaves, and showy yellow, orange, or blue flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x				

Botanical Description: Plants usually much-branched from the base. Flowers with yellow petals and a yellow center. Very narrow terminal portion of flower petals nearly as long as the broader basal portion.

Phenology: Flowers spring and summer.

Habitat: Scattered locations, usually on plains with disturbed or bare ground.

Similar Species: There are numerous similar species, all with stipular glands present on lower leaves: ***Linum puberulum*** has grayish stem and leaves, and a maroon center of golden petals. ***L. vernale*** is annual, with orange and white center of golden petals. ***L. berlandieri*** has sepals with a narrow terminal portion much shorter than the broader basal portion, the plant branched in upper parts, flowers with orange streaks toward center of golden petals. ***L. australe*** has smaller petals than the others (5–10 mm), and the flowers have no central coloration. There are two blue-flowered species: ***L. pratense*** is an annual found in the plains, whereas ***L. lewisii*** is a perennial often found in the mountains.

Uses: The seeds contain cyanide, but it is easily destroyed by cooking. However, whether Native peoples utilized the tiny seeds on this plant is not recorded.

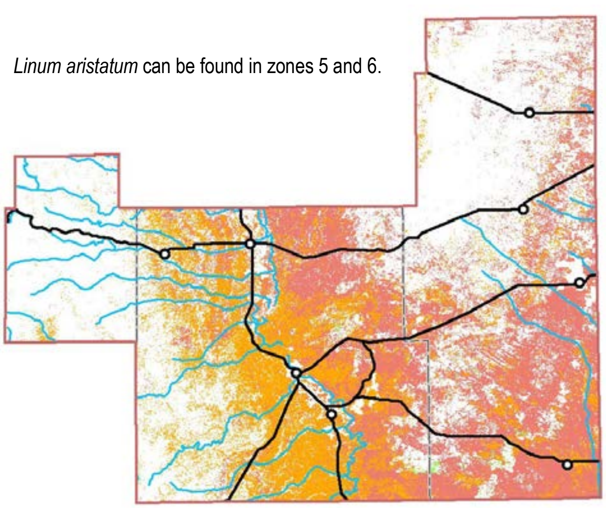
Storage: Dried leaves could be stored for many years.

Archaeology: This taxon was not found in the CFO region.

Flax

Flax stalks (of larger species of *Linum*) are the traditional source of fibers for linen, and were also used to make rope.

Flax –flower



Linum aristatum can be found in zones 5 and 6.

Stinging Serpent

Stinging Serpent –leaf

Stinging Serpent –flower

Stinging Serpent –seeds

Cevallia sinuata Lag. (CESI)
Stinging Serpent

Bright green leaves with sparse tiny spines.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x	x	x		

Botanical Description: Perennial herb or small shrub up to 1 m tall, but usually shorter. Stems and leaves have stinging barbed hairs. Leaves alternate, 2–7.5 cm long, lower surface densely hairy, edges toothed or lobed. Flowers occur in a dense head 1–4 cm in diameter, covered with white hairs. Flowers 1 cm in diameter, petals many, yellowish, often obscured by white hairs. Fruit dry seeds 1.5 cm long.

Phenology: Flowers May–October. Flowers at night; usually only hairy buds are observed during the day.

Habitat: In swales, arroyos or dry rocky limestone areas, often growing amid other plants; Chihuahuan Desert Scrub.

Similar Species: In the area, ***Tragia ramosa*** (in the *Euphorbiaceae*) also has stinging hairs, but it can be distinguished by having smaller, delicate leaves and stems and small pendant flowers.

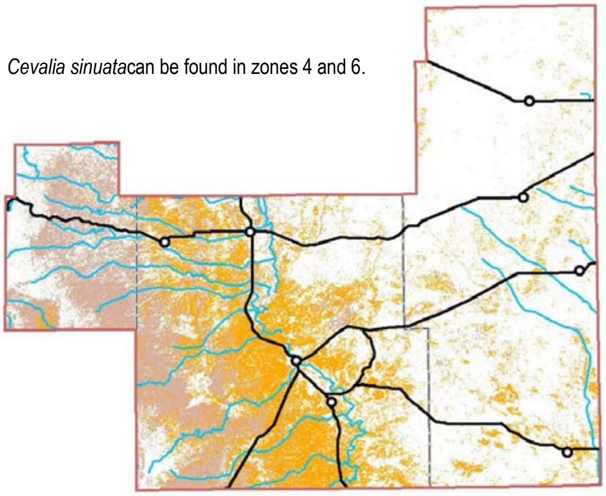
No recorded uses.

Storage: Dried leaves could be stored for many years.

Archaeology: This taxon has not been found in the CFO region.

Did you know?
The Loasaceae Family consists of herbs with alternate leaves, and showy white or yellow flowers with many petals. They usually have rough leaves with sticky or stinging hairs. The hairs on *Mentzelia* leaves look like cell phone towers (use a magnifying glass).

*Cevalia sinuata*can be found in zones 4 and 6.



Mentzelia multiflora (Nutt.) A. Gray ssp. (MEMU)
Blazing Star, Stickleaf

Showy yellow flowers, alternate leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x	x		
Leaves									x	x	x	x
seed									x	x	x	x

Botanical Description: Perennial herb to 80 cm tall, usually branched, with a strong, deep taproot. Stems white. Leaves sticky-rough like a cat's tongue, 15 cm long, 3 cm wide, edges toothed or lobed. Flowers yellow, petals 9–23 mm long, 3–10 mm wide. Fruit a cylindrical capsule 10–20 mm long, opening at the top. Seeds horizontal, winged, oval, flattened.

Phenology: March–October. Flowers open late in the afternoon and close in the evening.

Habitat: Roadside, disturbed areas, Sandhill Shrubland.

Similar Species: White-flowered *Mentzelias* also occur. ***Mentzelia nuda*** occurs mostly north of the region and has petals 25–50 mm long; ***M. strictissima*** occurs on sand dunes and has petals 15–24 mm long; ***M. humilis*** has even smaller petals (10–13 mm long) and only occurs on gypsum soils.

Ceremonial – Tewa Indians rubbed the leaves of the plant on boys when they were about to ride a horse for the first time, and the sticky leaves were supposed to help with the boy's grip and enable him to ride without falling off (Curtin 1984).

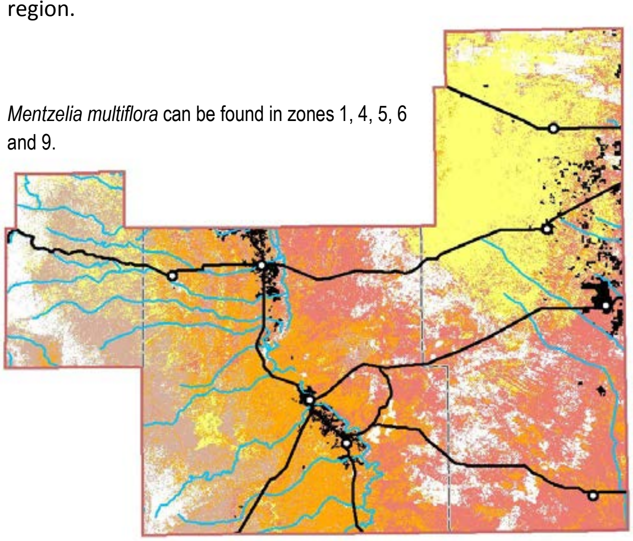
Food – *Mentzelia* seeds were an important food source for many tribes. The seeds have been eaten raw or parched and ground into a meal (Tull 2013).

Medicine – The leaves and roots were prepared as a treatment for tuberculosis. It has been used as a diuretic, a laxative and as a pain reliever for rheumatism and toothaches.

Storage: Dried seeds, leaves and roots could be stored for many years.

Archaeology: This taxon has not been found in the CFO region.

Mentzelia multiflora can be found in zones 1, 4, 5, 6 and 9.



Blazing Star

Blazing Star –flower

Blazing Star –fruit

Blazing Star –seeds

Globemallow

The Mallow Family is made up of thousands of species around the world, including cotton (*Gossypium* spp.), as well as edible species such as okra (*Abelmoschus esculentus*). Marshmallows were originally spun from the boiled roots of *Althaea officinalis*, although local *Malva* spp. can also be used (Elpel 2004).

Globemallow –flower

Unlike coffee and regular tea, a tea of mallow leaves is not dehydrating (Blair 2014).

Storage: Dried leaves could be stored for many years.

Archaeology: *Sphaeralcea* has been reported from one site in the CFO region, with two unidentified Malvaceae seeds from two sites. This is generally interpreted as being economically unimportant.

Sphaeralcea angustifolia (Cav.) G. Don (SPAN)
Globemallow

Grayish-green forbs with orange flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x	x	x		
Fruit							x	x	x	x		
Leaves				x	x	x	x	x	x			
Root	x	x	x	x					x	x	x	x

Botanical Description: Perennial forb with stems sometimes woody, 100 cm tall. Leaves alternate, linear/lance-shaped, hairy. Palmate-veined leaves, stipules present, four to six times longer than wide. Flowers radially symmetrical with five petals, orange. Fruits are a dry pod (shaped like a "Trivial Pursuit" game token), breaking into 9 to 17 segments. Each seed is comma-shaped.

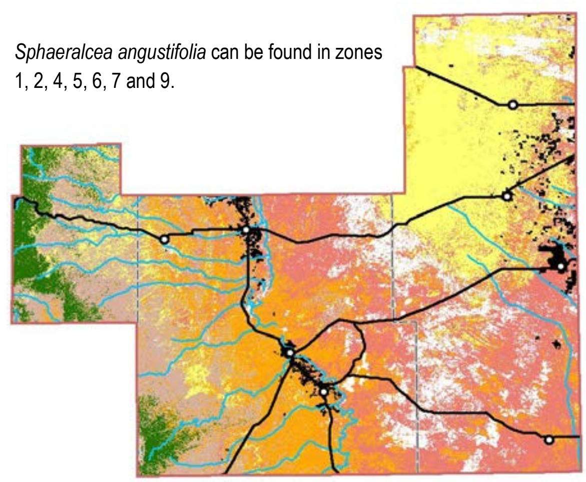
Phenology: Flowers May–October.

Habitat: Widespread in arid habitats and plains; Great Plains Shortgrass Prairie, Chihuahuan Semi-Desert Grassland.

Similar Species: Other Sphaeralcea have wider leaves with lobes. ***Sphaeralcea hastulata*** has lower leaf blades shallowly lobed and petals 10–20 mm long, pink to red to orange. ***Sphaeralcea laxa*** has lower leaf blades deeply divided; the outline of mid-stem leaf blades is longer than wide. It grows at slightly higher elevations compared to these other Sphaeralcea. ***Sphaeralcea coccinea*** also has lower leaf blades deeply divided but the outline of mid-stem leaf blades is circular or triangular, about as long as wide.

Food: The leaves are a mild addition to salad, blended and used as a thickener in soup, or dried and preserved for winter food. Green fruits can be eaten pickled—they taste similar to okra (which is also in the Malvaceae). Roots are edible when prepared like potatoes. For more information see *The Wild Wisdom of Weeds* (Blair 2014).

Medicine: The leaves and roots are mucilaginous and soothing for internal and external irritation, similar to aloe vera. Mallow leaves make an excellent sun tea and are even sold as tea in some places. The leaves contain salicylic acid (used to make aspirin) and ephedrine (a natural stimulant).



*Maclura pomifera (*Raf.) C.K. Schneid., (MAPO) Osage Orange, Bois d’arc

A medium-size cultivated tree with peeling bark, large thorns, and very large brain-shaped fruits.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x						
Root	x	x	x	x	x	x	x	x	x	x	x	x
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Trees 8–20 m tall. Peeling bark. Thorns stout, straight, to 1.5 cm. Paired buds. Leaves alternate on short hairy stalks (petioles), 4–12 cm long by 2–6 cm wide with pointed tips, shiny, with veins hairy on underside. Flowers small, yellow-green. Fruit a large 10–14 cm diameter green ball with bumpy surface, milky sap on the inside. Seeds are cream colored, 8–12 by 5–6 mm with one to three minute points, edges with a narrow groove.

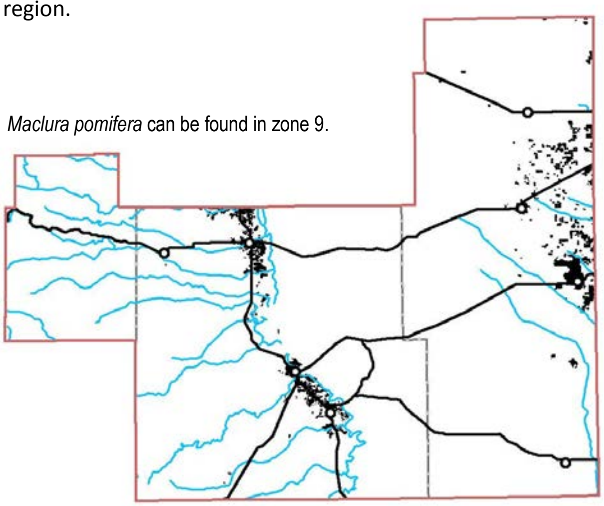
Phenology: Flowers spring.

Habitat: Not native. Cultivated in New Mexico, native to East Texas. Often found in hedges or thickets around old homesteads.

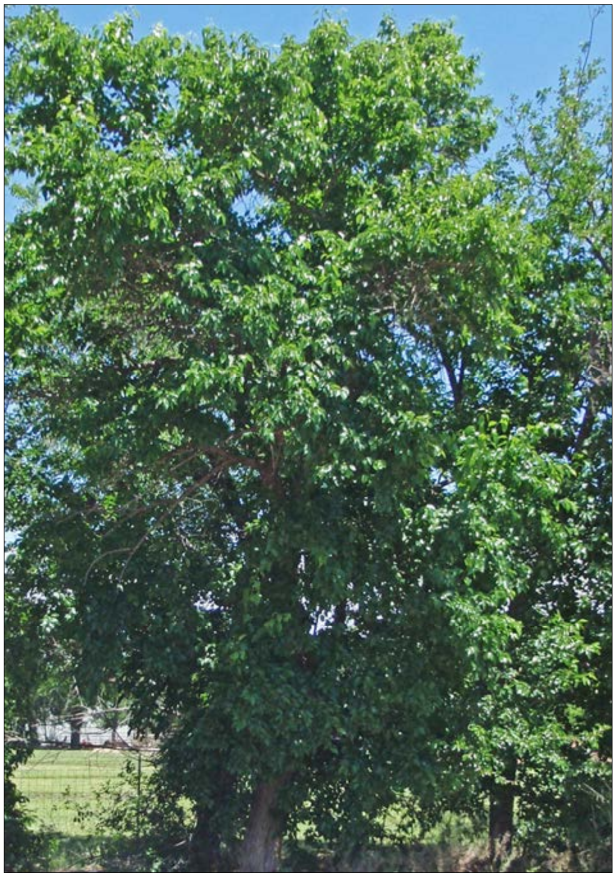
Wood—Used to make bows, hence the name bois d’arc. Indigenous cultural groups would travel over a thousand miles to obtain Osage Orange wood or procured it through trade, principally for making bows and other hardwood artifacts. For example: “This plant grew outside Tewa country but it was considered to be better for making bows than any native wood. It was brought from the east by the Tewa, or obtained from the Comanche or other Eastern tribes.” (Robbins et al. 1916) Consequently, the wood may have been a trade item for early Lipan and Jicarilla Apache with the eastern pueblos prior to Comanche incursion into the southwest. The Kiowa, Comanche, Seminole, Omaha, Pawnee, Pima, and Ponca also used the wood for bows and many modern bowyers today still consider Osage Orange to be one of the best bow woods.

Storage: The wood can be stored indefinitely in the proper conditions.

Archaeology: This taxon has not been found in the CFO region.



Maclura pomifera can be found in zone 9.



Osage Orange

Osage Orange –fruit

Osage Orange –bark


Texas Mulberry


Texas Mulberry –leaves


Texas Mulberry –berries

Morus microphylla Buckley, (MOMI)

Texas Mulberry

A small tree with alternate sandpapery leaves and delicious red berries.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x							
Fruit					x	x						
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Shrubs or small trees to 7.5 m. Leaves alternate, oval or deeply lobed, hairy-sandpapery, serrate. Flowers in spikes 1–2 cm long, greenish white. Fruit a short-cylindrical berry 1.0–1.5 cm long, turning red, purple, and black. Seeds small, about 2 mm, smooth, yellowish, oval, flattened.

Phenology: Flowers spring, berries ripening in late spring / early summer.

Habitat: Common around stock tanks, disturbed water sources, and along streams.

Ceremony: Seeds were worn on a string around the neck during ceremonies (Castetter and Opler 1936).

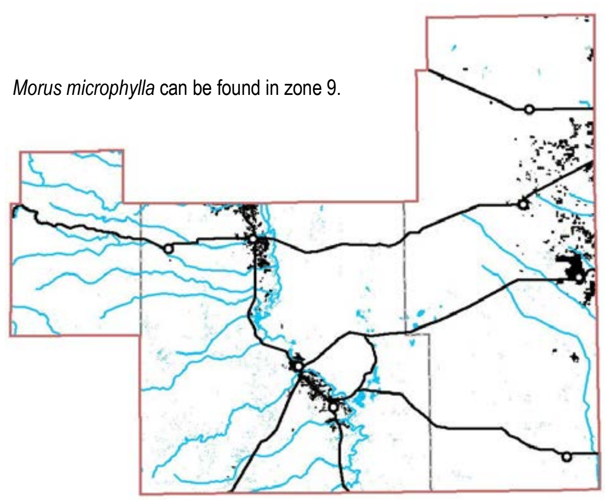
Food: This native tree has smaller fruit than introduced species commonly planted in yards. The berries of this species are ripe when they turn black (Tull 2013). Berries were eaten by the Apache fresh (Basehart 1960; Castetter and Opler 1936), or the fruit was pressed into pulpy cakes, dried, and stored for winter (Castetter and Opler 1936). Berries were also dried and spread on mescal (Basehart 1960). The wood is reported to make good bows (Opler 1935).

Medicine: Used as a narcotic (Castetter and Opler 1936).

Weapons: Wood used to make the best war bows (Basehart 1960).

Storage: The wood can be stored indefinitely in the proper conditions, fruit when prepared could be stored for a season.

Archaeology: This taxon has not been found in the CFO region.


Morus microphylla can be found in zone 9.

Abronia fragrans Nutt. ex Hook. (ABFR2)
Snowball Sand Verbena

Large clusters of white flowers on a sand dune plant, very fragrant flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x				
Leaves				x	x	x	x	x	x	x		
Root						x	x	x	x	x	x	x

Botanical Description: Perennial. Stems semi-erect, somewhat branched, sometimes reddish at base and nodes, with glandular hairs. Leaves on stalks 0.5–8 cm, triangular to lance-shaped, 3–12 cm by 1–8 cm. Flower tubes greenish to reddish purple, 10–25 mm long, petals white 6–10 mm long. Fruits deeply grooved, heart-shaped, 5–12 mm by 2.5–7 mm.

Phenology: Flowering March–August.

Habitat: Sandy soils. Sandhill shrubland.

Food: (Acoma and Laguna) roots ground and mixed with corn meal (Castetter 1935, pg. 39).

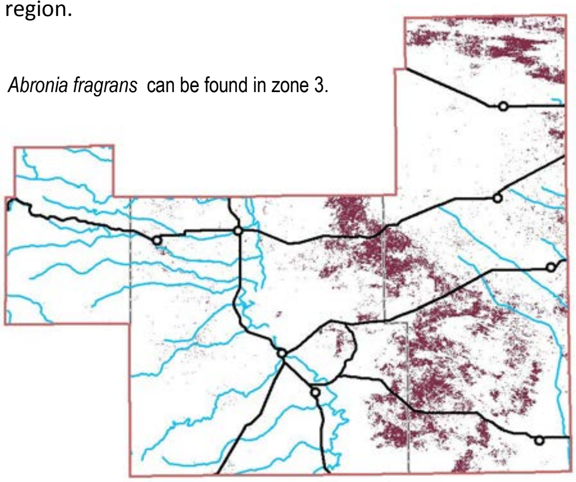
Medicine: (Keres) roots ground and mixed with corn meal and eaten to enhance appetite, make one fat, to prevent greed (Swank 1932, pg. 24).

Ceremony: (Keres) Flowers made into a ceremonial necklace (Swank 1932, pg. 24).

Storage: Roots could be stored for several months.

Archaeology: This taxon has not been found in the CFO region.

Abronia fragrans can be found in zone 3.



Snowball Sand Verbena –flower

Snowball Sand Verbena

Snowball Sand Verbena –flowers

Sundrops

Sundrops -flower

The Onagraceae Family consists of forbs and small shrubs with yellow or white four-petal flowers.

Sundrops –leaves & stem

Calylophus serrulatus (Nutt.) P.H. Raven (CABEP2) Sundrops

Yellow four-petal plant with a woody base.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x	x	x	
Fruit	x				x	x	x	x	x	x	x	x

Botanical Description: A subshrub, much branched, up to 50 cm tall. Leaves alternate, toothed, up to 9 cm long. Flowers with four petals, yellow, flower tube 2.5 cm long, petals 5–12 mm long. Sepals with a keeled midrib, eight stamens of two different lengths. Fruit is a cylindrical capsule.

Phenology: Flowers March–November. Flowers open in the morning and close in the afternoon.

Habitat: Sandy or rocky ground, eastern Plains. Sandhill Shrubland, Chihuahuan Semi-Desert Grassland.

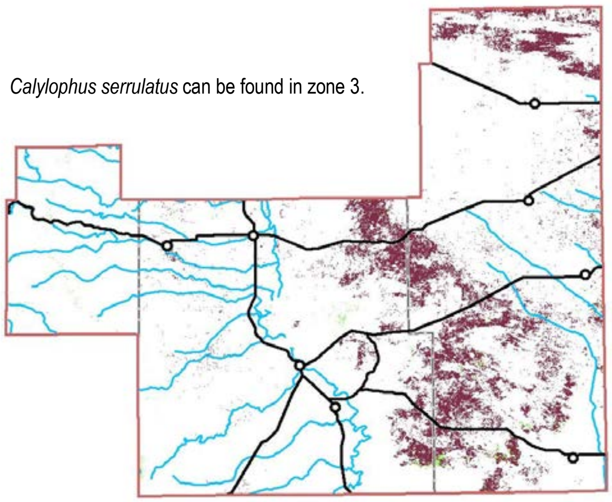
Similar Species: ***Calylophus berlandieri*** is similar, but the flowers are larger, petals 12–50 mm long. Three other species of *Calylophus* occur, but these all have sepals without a keeled midrib and their stamen are of equal length. ***Calylophus tubicula*** has taller, woody stems and small flowers that open in the morning. ***Calylophus lavandulifolius*** is a subshrub 8–15 cm high, stems and leaves whitish with appressed hairs, with flowers that open in the afternoon or evening. ***Calylophus hartwegii*** is taller than 15 cm, stems and leaves not whitish, leaves 1–4 mm wide. Its flowers also open in the afternoon or evening.

Food: *Calylophus lavandulifolius* pods were cooked and eaten by Chiricahua and Mescalero children (Castetter and Opler 1936).

Medicine: *Calylophus hartwegii* ssp. *fendleri* was used by the Navajo as 'life medicine,' especially for internal bleeding (Vestal 1952).

Storage: The dried leaves could be stored for several years.

Archaeology: This taxon has not been found archaeologically in the CFO region.



Calylophus serrulatus can be found in zone 3.

Oenothera albicaulis Pursh (OEAL)
Whitest Evening Primrose,
Amapola del campo
Tł 'u naitsuin (Mescalero Apache)

White four-petal flower from a basal rosette.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x	x	x	
Fruit				x	x	x	x	x	x	x	x	x
Leaves		x	x	x	x							
Seed	x	x			x	x	x	x	x	x	x	x

Botanical Description: Annual from a basal rosette, sometimes flowering without an erect stem. Leaves hairy, basal leaves entire to deeply dissected. Flowers white.

Phenology: Flowers March–November.

Habitat: Chihuahuan Semi-Desert Grassland, Mesquite Scrub.

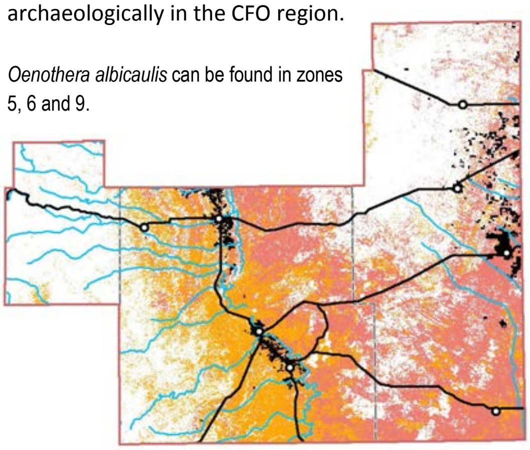
Similar Species: ***Oenothera caespitosa*** also has no stem, but the white flower is longer, 3.5–16 cm long**.** ***Oenothera triloba*** also has no stem, but petals are yellow, leaves are incised. ***Oenothera engelmannii*** has an erect stem, white flowers, hairy stems. ***Oenothera rhombipetala*** has yellow petals, flower tube 2–5.5 cm long, stems erect, flowers in terminal spikes. ***Oenothera grandis*** has yellow petals, deeply lobed leaves, petals 2–4 cm long.

Food: The seeds were ground and made into gravy or boiled in soups (Castetter and Opler 1936). The fruit was chewed as a delicacy without preparation (Castetter and Opler 1936). Young leaves taste "delightful" raw in a salad. They turn bitter after the plant flowers (Tull 2013). The leaves of all *Oenothera* are edible if boiled in several changes of water to remove the bitter taste (Warnock 1974). Perennial species have edible tap roots (Elpel 2007).

Medicine: Although no documentation was found that indicates Mescalero Apaches used this plant for medicinal purposes, some tribes made poultices from the plant and applied it for throat issues (Vestal 1952). Decoctions of the root were taken and used as a lotion for muscle strain, rheumatism (Vestal 1952). This was called a "life medicine" by the Navajo (Vestal 1952).

Storage: Dried leaves could be stored for several years.

Archaeology: This taxon has not been found archaeologically in the CFO region.



Oenothera albicaulis can be found in zones 5, 6 and 9.

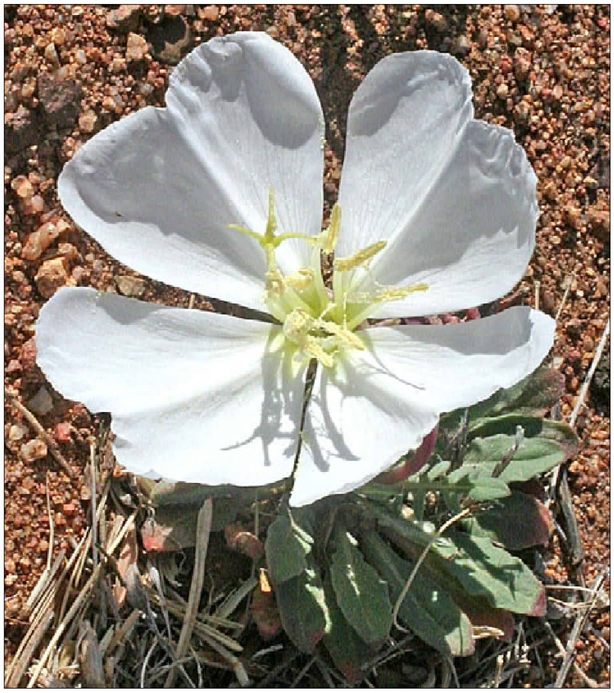
Whitest Evening Primrose

There are three genera in the Evening Primrose Family in the region, and all of their species are closely related. In fact, all three genera are sometimes combined as *Oenothera*.

Calylophus: Yellow-flowered shrubs and subshrubs (plants with woody stems).

Oenothera: White- or yellow-flowered forbs, erect or from rosettes.

Gaura: White-flowered forbs, erect.



Whitest Evening Primrose –flower

Beeblossom

Oenothera cinerea
(Wooton & Standl.) W.L. Wagner & Hoch
Formerly - *Gaura villosa* Torr.
High-plains Beeblossom
Ts e' ghá neesáhee' (Mescalero Apache)

A tall, gray-fuzzy forb with white flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x	x	x	
Fruit	x				x	x	x	x	x	x	x	x

Botanical Description: Densely gray-fuzzy. Leaves in a basal rosette and whorled on stem. Flowers in spikes, open in the evening. Four petals on the upper side of the flower, eight stamen on the lower side.

Phenology: Flowers March–November.

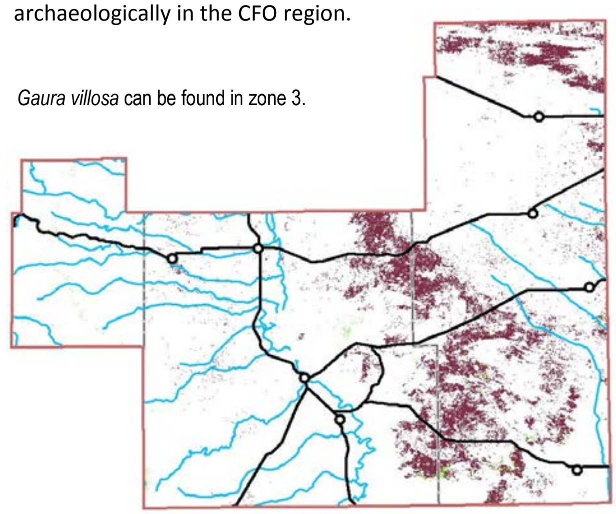
Habitat: Roadsides, sandy areas: Sandhill Shrubland.

Similar Species: Oenothera *suffulta* is very similar, but has longer and wider flowers, 8–12 mm long, petals 10–15 mm wide. ***Oenothera suffrutescens*** has ascending (not stiffly erect) stems, seldom over 40 cm tall, stem leaves 1–4 cm long.

Medicine: (Ramah Navaho) cold infusion used to settle children's stomach (Vestal 1952, pg. 37).

Storage: Dried leaves could be stored for several years.

Archaeology: This taxon has not been found archaeologically in the CFO region.



Gaura villosa can be found in zone 3.

Beeblossom –flowers

Beeblossom

Argemone squarrosa Greene (ARSQ)
Hedgehog Pricklypoppy

Large white papery flowers (sometimes streaked with pink) on a thistle-like plant.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x				
seed							x	x	x	x	x	x

Botanical Description: Perennial wildflower with prickly leaves. The stems contain a yellow-to-orange latex sap. Stems widely branching, 40–80 cm long, prickly. Leaves prickly, lobed and toothed on the edges. Flowers prickly, 8–11 cm diameter, white, turning pink. Long (8–15 mm) branched prickles on capsules. Major spines green-based, with lateral branches. Seeds 2–2.5 mm.

Phenology: Flowers summer.

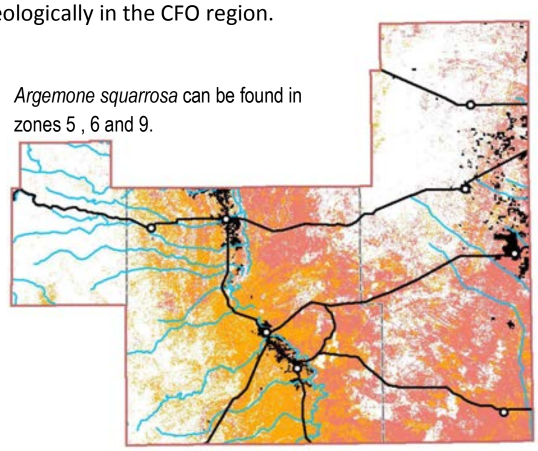
Habitat: Disturbed areas, roadsides.

Similar Species: ***Argemone polyanthemos*** and ***Argemone pleiacantha*** both have simple, short (4–10 mm) prickles on their capsules.

Medicine: The seeds contain substances that cause dilation of blood vessels; when taken internally the resulting edema can be severe enough to cause death. Crushed seeds were used topically as a salve for boils, burns, and other open wounds. The salve was also used to treat head lice, toothaches, and eye irritations (Carlson and Jones 1940). In Mexico, it has been used to treat snake bites, chest pains, fevers, and bad breath.

Storage: Seeds and leaves could be stored for several years.

Archaeology: This taxon has not been found archaeologically in the CFO region.



Hedgehog Pricklypoppy –fruit

Hedgehog Pricklypoppy

The Poppy Family, like the Brassicaceae and the Onagraceae, has flowers with four petals. Poppies can be distinguished by their milky sap and prickles—they are sometimes confused with thistles. Opium is derived from a poppy, *Papaver somniferum*, that is also cultivated for poppy seeds used in baking, and also in flower gardens.

Hedgehog Pricklypoppy –flower

Hedgehog Pricklypoppy

Devil's Claw

Proboscidea louisianica **(Mill.) Thell. (PRLO)**
Devil's Claw, Louisiana Ram's Horn, Unicorn Plant, Una de Gato, Torito, Cuernitos
Daaghéédé**,** ***daayadebitabizaye*** **(Mescalero Apache)**

Thick-stemmed with large broad opposite leaves, large hooked claw-like fruit, split in two halves when dry.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x	x		
Fruit								x	x	x	x	x
Seed								x	x	x	x	x

Botanical Description: Annual forb up to 60 cm tall and 2 m wide, the entire plant covered in foul-scented glandular hairs. Stem thick, branched, sprawling. Leaves opposite, upper leaves sometimes alternate, long-stalked, up to 25 cm long, rounded to kidney- or heart-shaped, irregularly wavy. Flower in clusters of 8–20, petals dull white to lavender with spotted purple and yellow, 3.5–5.5 cm long, lobes 15–25 mm wide. Fruit a four-chambered capsule with a fleshy outer covering, splitting along two lines, 10–20 cm long, with two long curved beaks at the tip.

Phenology: Flowers between June–October.

Habitat: Sandy areas, Sandhill Shrubland.

Similar Species: ***Proboscidea sabulosa*** also occurs in similar areas, but has fewer and smaller flowers (flower 2 cm long, lobes 4–5 mm long, fewer than six flowers).

Food: Young pods are edible after boiling 15–20 minutes and have been compared to okra. They were commercially pickled and canned in the early part of the 20th century. The edible seeds were traditionally ground to make meal (Tull 2013). Mescalero and Chiricahua prisoners of war in Oklahoma ate the seeds (Castetter and Opler 1936). The oil-rich seeds and the tender, immature pods were eaten by the Apache, the Comanche, and Mexican herders (Nabhan and Kindscher 2006).

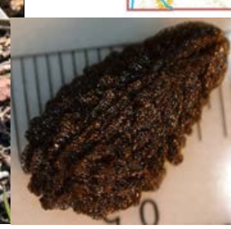
Other: The dry fruits have been used to lift a hot pot of coffee from the fire, thus a common name is "pot-hook" (Warnock 1974).

Storage: Pods could be canned and preserved for several years.

Archaeology: This taxon has not been found archaeologically in the CFO region.

Devil's Claw –fruit

Proboscidea louisianica can be found in zones 3 and 6.



Devil's Claw –seed

Pinus edulis Engelm., (PIED)
Piñon Pine, Twoneedle Pinyon
Nistei (Mescalero Apache)

Small cones and short needles compared to other pines.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Branches	x	x	x	x	x	x	x	x	x	x	x	x
Flower					x	x						
Needles	x	x	x	x	x	x	x	x	x	x	x	x
Nuts									x	x	x	
Pollen				x	x							
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Shrubs or small trees to 21 m, Leaves are needles, two per bunch, upcurved, 2–4 cm long by about 1 mm wide. Seed cones 4 cm in diameter, broadly spherical, seeds 10–15 mm, without wings.

Phenology: Evergreen. In good years, cones begin developing in late spring, mature in the fall.

Habitat: Upper foothills and mountains. Pinyon-Juniper.

Ceremonial: Piñon nuts were considered an important food for girls' puberty rites (Basehart 1960). The Mescalero gathered piñon pollen in the spring and used it as a substitute for cattail pollen.

Cradles: Resin from the tree used for waterproofing basketry jugs, and young trees were used for the main hoop of an infant's cradleboard (Basehart 1960).

Food: Nuts used for flavor, but were also considered a subsistence food. The Mescalero Apache valued the piñon nut but did not rely on it because the crop was too unpredictable. The harvest fluctuated due to variability in the local tree populations and to long-term weather conditions. However, once parched, the piñon nut was easily stored so they collected large quantities whenever possible. Nuts were usually collected in October, but they could persist on the trees throughout the winter if the crop was bountiful (Basehart 1960).

Nuts were either collected off the ground, or a hide was laid out on the ground under a piñon tree and the nuts would be shaken from the tree (Basehart 1960). Up to 25 pounds could be collected in one day (Basehart 1960). Nuts could be parched in the sun, or heated with stones or over a fire. Nuts were ground either with the shell or not, and mixed with banana yucca fruits, mescal, sotol, or mesquite beans (Basehart 1960).

The powder or meal was mixed with other foods, including banana yucca, mesquite meal, or agave/sotol cakes. Seeds mixed with yucca fruit pulp were made into a pudding or ground, then rolled into a ball, and eaten as a delicacy (Castetter and Opler 1936). The nuts were stored in containers (Basehart 1960; Buskirk 1986).

Medicine: Colds were treated by inhaling smoke from the needles or from burning resin (Basehart 1960; Moerman 2009). Needles and resin were also used as a dermatological and gastrointestinal aid (Swank 1932). Lipan Apache used the needles to make tea and as an infusion to treat eye troubles (Opler 1935).

Weaving: The wood was also used for weaving implements (Basehart 1960).

Wood: Wood used to make saddles and as firewood; branches were used for bedding (Opler 1935).

Piñon Pine

Piñon Pine –cone with seeds

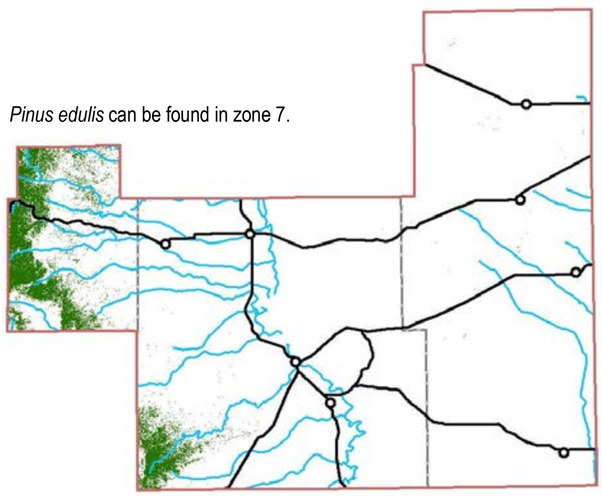
Piñon Pine –flowers

Storage: Needles, wood, and nuts can be stored for many years.

Archaeology: Piñon is seldom recovered from archaeological sites. In the eastern Trans-Pecos, however, two mortars made of piñon wood have been found in caves or crevices in Terrell County (Collins and Hester 1968; Prewitt 1981). One of the mortars contained prickly pear seeds, attesting to its use for pulverizing the fruit, or possibly indicating post-use rodent activity (Collins and Hester 1968). *Pinus* wood has been found in 13 sites in the CFO region, making it a minor fuel species in the area.

Pine needles have a mild diuretic and expectorant function. The inner bark is an even stronger expectorant with the pitch being the strongest of all. The pitch also has some use as a lower urinary tract disinfectant but is inappropriate to use when kidney inflammation is present. (Moore 2003) Pine needle tea is rich in vitamin C (some sources say 4 to 5 times more than fresh squeezed orange juice) and vitamin A. Sacajawea used pine needle tea to treat cases of scurvy on the Lewis and Clark Expedition. However, pine needle tea may also contain phytoestrogen molecules, which can lead to miscarriages in some women.

Piñon Pine –nuts



Pinus edulis can be found in zone 7.

Nuts were sometimes gathered from packrat nests. It is reported that one nest yielded more than 50 pounds of nuts!

Pine sap (pitch) from these trees was also used to remove facial hair (Buskirk 1986).

Piñon Pine –flowers and fresh growth

Piñon Pine –seeds

Pinus ponderosa C. Lawson, (PIPO)
Ponderosa Pine

Large, tall, straight tree with long needles, growing in the mountains.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x						
Sap										x	x	
Seed										x	x	
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Large trees up to 72 m tall, trunk straight. Bark yellow- to red-brown with puzzle-piece scales, often smells like vanilla. Leaves are needles, two to five per bunch, 7–25 cm long by about 1 mm wide, tufted at twig tips, bendable, drooping. Seed cones 5–15 cm long with a stout spur or prickle on each scale. Seeds 4–9 mm with a wing 15–25 mm.

Phenology: Evergreen. Cones begin developing in spring, mature in the fall.

Habitat: Above 1,829 m in the Guadalupe and Sacramento Mountains.

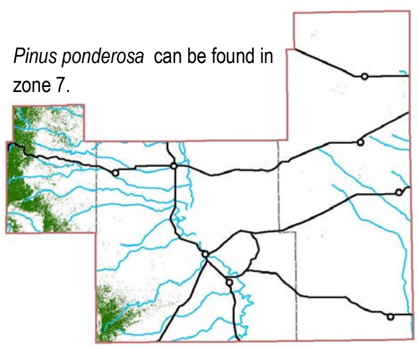
Food: Seeds were ground, rolled into balls, and eaten raw. In times of starvation, the inner bark could be scraped off and baked in the form of cakes. The bark was also boiled or eaten raw (Castetter and Opler 1936).

Medicine: Navajo made a decoction from the needles for cough and fever, and as a ceremonial emetic (Vestal 1952). In other groups, a poultice was made of pitch and melted animal tallow or lard and used for backaches (Hart 1992), healing sores and boils (Turner and Kennedy 1980), and as an eyewash (Turner and Kennedy 1980), as well as many other uses.

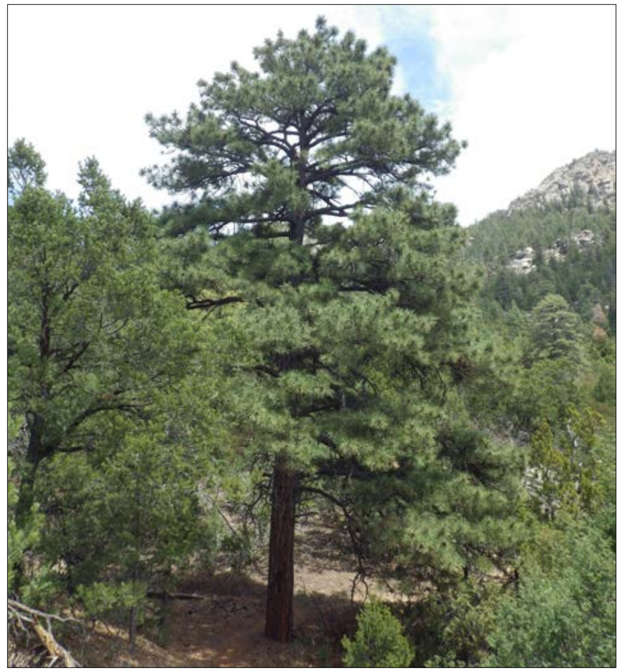
Veterinary: Hot gum and animal fat were poured on horses' sores or wounds (Steedman 1928).

Storage: Needles and wood can be stored for many years.

Archaeology: This taxon has not been found in the CFO region.



Ponderosa Pine –seeds


Ponderosa Pine

Most ponderosa pine forests in the Southwest were logged in the late 1800s and early 1900s. The wood was especially useful for construction lumber, mine supports, and railroad ties.


Ponderosa Pine –cone


Ponderosa Pine –bark


Southwestern White Pine


Southwestern White Pine –needles


Southwestern White Pine –cone

Pinus strobiformis Engelm., (PIST3)
Southwestern White Pine

Large (15–25 cm long) cones, growing at high elevations on mountains.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x						
Needle	x	x	x	x	x	x	x	x	x	x	x	x
Sap										x	x	
Seed										x	x	
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Trees up to 30 m tall, trunk up to 1 m in diameter, slender, straight. Bark gray, furrowed, with narrow, irregular scaly ridges. Branches spreading-ascending. Leaves five per bundle, persisting 3–5 years, 4–9 cm long. Upper surface conspicuously whitened. Pollen cones 6– 10 mm, pale yellow-brown. Seed cones maturing in 2 years, shedding seeds and then falling; 15–25 cm long on stalks up to 6 cm long. Seeds ovoid, 10–13 mm, wingless.

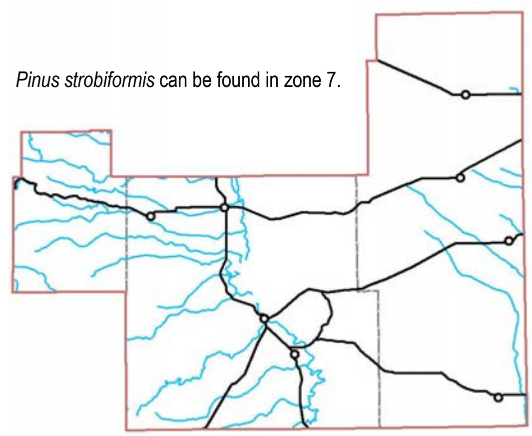
Phenology: Evergreen. Cones begin developing in spring, mature in the fall.

Habitat: Above 6,000 feet in the Guadalupe and Sacramento Mountains.

Food: Seeds were roasted and hulled or sometimes the seeds ground shell and all, and eaten.

Medicine: Needles of limber pine were boiled by the Navajo as a ceremonial medicine, an emetic to aid in reducing fever and cough, and were smoked by hunters to wish them “good luck” on hunting trips (Vestal 1952).

Storage: Needles, wood, and nuts can be stored for many years.



Archaeology: This taxon has not been found in the CFO region.


Southwestern White Pine –seed

Plantago patagonica Jacq. (PLPA2)
Plantain

A small, fuzzy grass-like plant.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower		x	x	x	x	x	x					
Leaves			x	x	x	x						
Seed			x	x	x	x	x					

Plantain

Botanical Description: Annual forb up to 30 cm tall. Leaves linear, 1–15 cm long, 0.1–0.7 cm wide, sparsely to densely hairy. Flower spikes 2–22 cm long, hairy. Flowers 2–5 mm long, hairy, greenish. Fruit a capsule, breaking below the middle, with two seeds, each 2.2 mm long, 1.2 mm wide, reddish brown to brown, concave.

Phenology: Flowers February to July.

Habitat: Chihuahuan Semi-Desert Grassland.

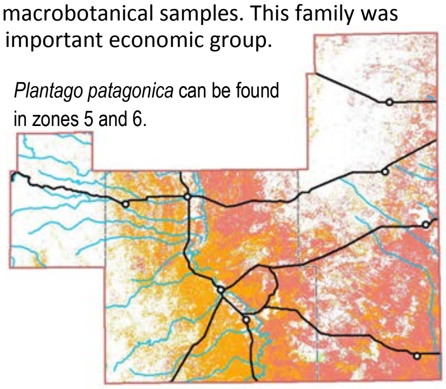
Similar Species: The European species, ***Plantago major***, is a common weed of lawns, and is much larger than its wild relatives.

Food: The entire plantain plant is edible, and has been used as a staple food. Both unripe green seeds and ripe brown seeds are edible raw. The leaves make a strong-tasting salad green described as an "acquired taste," but high in nutrients (Blair 2014). The leaves are edible boiled and are rich in vitamins A, C, and K (Elpel 2004). The seeds are mucilaginous. *P. patagonica* is related to psyllium (*P. ovata*), whose mucilaginous husks have been consumed for their fiber.

Medicine: Leaves and seeds could be used for a number of remedies: to draw out the poison of rattlesnake bites, soothe rheumatic pain, as a poultice to treat battle wounds, sores, insect bites, tuberculosis, sore throat, laryngitis, urinary infections, digestive problems, and as a blood purifying tonic. The root of the herb was used to relieve toothache and the juice to relieve earache.

Storage: Leaves and seeds could be stored for several years.

Archaeology: Three sites have Plantaginaceae seeds recovered from macrobotanical samples. This family was probably not an important economic group.



Plantago patagonica can be found in zones 5 and 6.

Plantain –seeds

Plantain –flower

Excavating a pithouse in the Carlsbad Region

Achnatherum hymenoides (Roem. & Schult.) Barkworth (ACHY)

Indian Ricegrass (syn. Oryzopsis)

Medium bunchgrass, open diffuse flowering spikes.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x				
Seed									x	x	x	x

Botanical Description: Perennial grass. Stems tufted in a cluster, 25–70 cm tall, 0.7–1.3 mm thick, smooth. Stem nodes 3–4, swollen. Stems exceed basal leaves, leaf sheath mostly open or loose, smooth. Leaf blades very narrow, less than 2 mm wide, edges folded or rolled, smooth. Ligules 1.5–4 mm, translucent, sharpened. Flower clusters 9–20 cm long, 8–14 cm wide, branches 3–15 cm. Each floret is singular on a paired short sub-branch. Glumes 5–9 mm long, 0.8–2 mm wide, hairy, awns 3–6 mm long, deciduous.

Phenology: Flowers spring and summer.

Habitat: Dry, well drained soils.

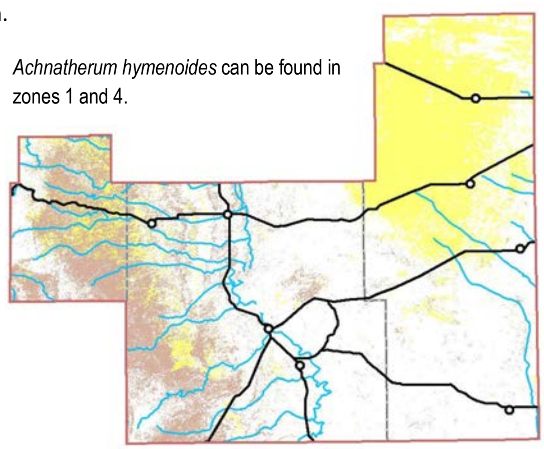
Food: Indian ricegrass was possibly the most important wild grain. Seeds can be collected by early summer, threshed to remove the chaff and ground to make flour. Grazing by domestic cows has almost extirpated this species from the vast areas where it was once abundant (Tull 2013).The Western Apache ground the seeds, mixed with corn meal and water and made a mush (Buskirk 1986). The White Mountain Apache used the seeds for mush, bread, pones, and food. They also used the dried plant for hay. (Reagan 1929)

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Indian Ricegrass

Indian ricegrass is a nitrogen-fixing grass that can stabilize and fertilize soil.



Achnatherum hymenoides can be found in zones 1 and 4.

Indian Ricegrass –Seed

Indian Ricegrass –after dropping seeds

Big Bluestem

Big Bluestem –flower

Big Bluestem –floret

Andropogon gerardii Vitman (ANGE)

Big Bluestem

Robust bunchgrass with a white waxy coating on stem.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x	x			
Root	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Perennial grass forming large clumps. Stems 1–3 m tall, usually with a white waxy coating that can be rubbed off. Ligules 0.4–2.5 mm. Leaf blades 5–50 cm long, 5–10 mm wide, usually minutely hairy on the upper surface, at least near base. Flower spikes 2–5, each 5–11 cm long, purplish to yellowish, hairy. Florets 3.5–12 mm long, awns 8–25 mm. Flower spike branches fall apart at maturity to disperse seeds.

Phenology: Flowering July–September with summer rains.

Habitat: Dry grasslands.

Similar Species: Similar to *Schizachyrium* and *Bothriochloa*, but these have hairier florets in longer clusters.

Food: To bake mescal hearts, this grass was laid on top of hot stones, and the mescal hearts were laid on top of the grass (Castetter and Opler 1936).

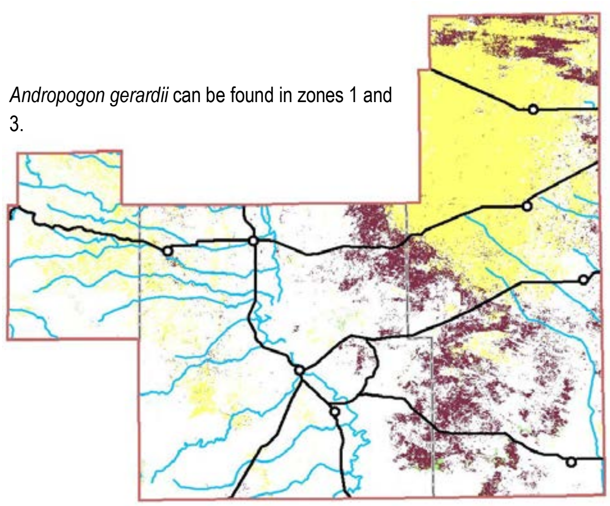
Artifacts: Mescalero and Chiricahua used big bluestem as mats and coverings for drying fruit. (Castetter and Opler 1936)>

Medicine: Although no documentation was found for SE NM ethnobotanical use as medicine, big bluestem has been used as an analgesic for stomach pain, decoctions have been used as a diuretic, and as an aid to reduce fever (Densmore 1928).

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Andropogon gerardii can be found in zones 1 and 3.



Bothriochloa barbinodis (Lag.) Herter (BOBA3)
Cane Bluestem

Medium bunchgrass with very fuzzy flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				

Botanical Description: Perennial grass forming clumps. Stem nodes hairy. Stems 60–120 cm tall, less than 2 mm thick branched, leaves arrayed along stem. Ligules 1–2 mm. Leaf blades 20–30 cm long, 2–7 mm wide, sometimes minutely hairy near base. Flower spikes 5–14 cm at the end of larger stems. Branches 4–9 cm, erect. Florets 4.5–7.3 mm long, glumes with short hairs, awns 20–35 mm.

Phenology: Flowers during the summer.

Habitat: Wetter areas, roadsides, and borders of swales in good soils. Warm Desert Washes. Often associated with *Pleuraphis mutica* or even *Setaria leucopila*.

Similar Species: Other species of *Bothriochloa* occur. ***Bothriochloa springfieldii*** is smaller, only 30–80 cm tall, unbranched, with small basal leaves 5–30 cm long and 2–3 mm wide, and flower spikes less than 5 cm long. ***Bothriochloa laguroides*** is similar in size to *B. barbinodis*, but has awns less than 18 mm long. ***Bothriochloa ischaemum*** is very similar, but invasive. Its florets are all the same size, as opposed to *B. barbinodis,* which has much larger stalkless florets than stalked florets.

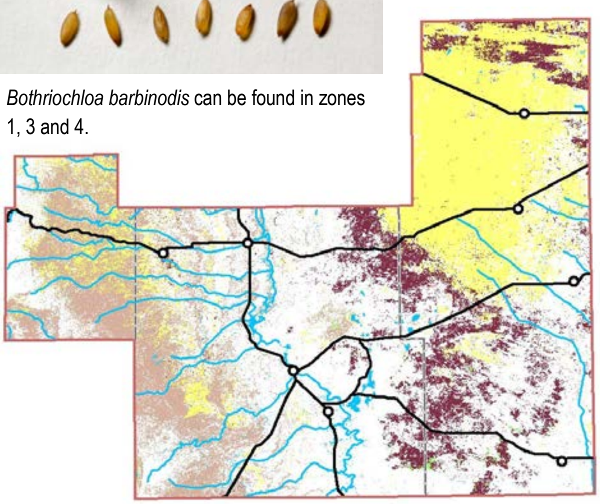
No recorded uses.

Storage: Dried seeds could be stored for several years.

Cane Bluestem –florets and seed

Archaeology: This taxon has not been found in the CFO region.

Bothriochloa barbinodis can be found in zones 1, 3 and 4.



Cane Bluestem

Cane Bluestem –florets

Black Grama –habitat

Black Grama –flower

Black Grama –seeds

Black Grama –hairy stems

***Bouteloua eriopoda* (Torr.) Torr(BOER4)**
Black Grama
***Dzil a tl'uh késtas í* (Mescalero Apache)**

Tangled low-spreading bunchgrass, the only grass species with alternating hairy and smooth stems.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				

Botanical Description: Perennial grass spreading by horizontal stems (stolons) and roots. Stems 20–60 cm long, wiry, woolly-hairy. Ligules tiny, hairy. Leaf blades 2.5–6 cm long, 0.5–2 mm wide. Flower spikes 2–16 cm long with 2–8 branches. Branches are 14–50 mm long, persistent, with 8–18 florets. Glumes 2–8 mm long.

Phenology: Flowers during the summer.

Habitat: Chihuahuan Semi-Desert Grassland and Chihuahuan Desert Scrub.

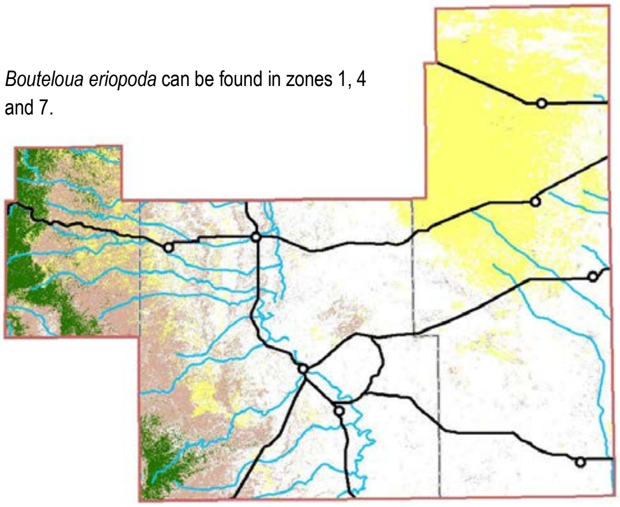
Similar Species: This is a bushy, indistinct species that can sometimes look a lot like ***Muhlenbergia porteri*** (bush muhly), but black grama is overall less hemispherical, has much larger flower spikes, and hairy stems.

Forage: Black grama is one of New Mexico's most valuable and nutritious grasses. It is highly palatable and a good forage producer, and it remains palatable and nutritious throughout the year. Because it cures well and the stems remain green near the ground, black grama is well adapted to fall, winter, spring grazing. (NMSU College of Agriculture) An important forage plant for bison, Apache horses, and cattle. "It is this plentiful distribution of the most strengthening grass in the world which enables the Apache to maintain his [horse] herds, make his extraordinary marches, and inflict wide-spread depredations (Cremony, 1868)." Grama grass is specifically referenced in some Apache cultural stories.

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Bouteloua eriopoda can be found in zones 1, 4 and 7.



Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths (BOGR2)
Blue Grama, *Tl' estase* (Mescalero Apache)

Short sod-forming or bunchgrass with "mustache"-like flower spikes.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x	x	x		
Seed							x	x	x	x		
Stem	x	x	x	x	x	x	x	x	x	x	x	x

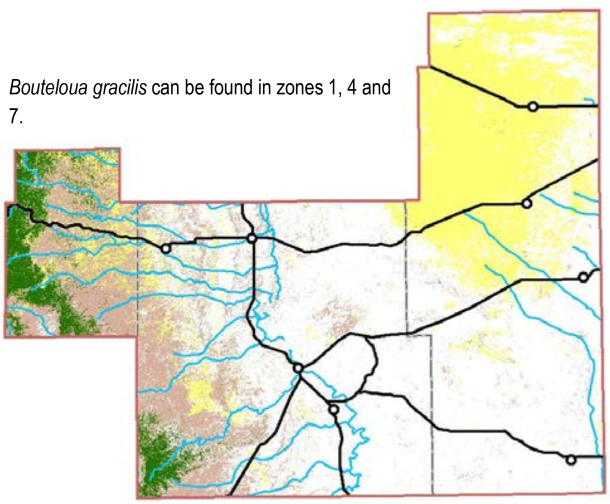
Botanical Description: Perennial grass, usually clumped. Stems 24–70 cm tall with 2–3 nodes. Leaves mainly basal, 2–12 cm long, 0.5–2.5 mm wide. Ligules tiny, hairy. Flower spikes with 1–3 branches, 13–50 mm long with 40–130 florets. Glumes 1.5–6 mm long.

Phenology: Flowers in summer.

Habitat: Great Plains Shortgrass Prairie, Chihuahuan Semi-Desert Grassland.

Similar Species: ***Bouteloua barbata*** is a tiny annual version of *B. gracilis*. ***Bouteloua curtipendula*** (sideoats grama) has flowers spaced out along one side of the vertical stem, usually taller than *B. gracilis*, up to 80 cm. Moist *B. curtipendula* was laid on hot stones when baking to prevent steam from escaping (Castetter and Opler 1936) .

Blue Grama



Bouteloua gracilis can be found in zones 1, 4 and 7.

Artifacts: Stems used as comb and broom material by White Mountain and Western Apache. (Buskir 1986, Reagan 1929).

Food: Western Apache ground the seeds, mixed with corn meal and water and made a mush. (Buskirk 1986) White Mountain Apache ground the seeds and made bread and pones. (Reagan 1929) An important forage plant for bison, Apache horses, and cattle. Grama grass is specifically referenced in some Apache cultural stories.

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Blue Grama –flowers

Blue Grama –florets

Coastal Sandbur

Cenchrus spinifex Cav. (CESP4)

Coastal Sandbur

Short grass with wide leaves and horrible spiny burs.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				

Botanical Description: Annual grass seldom over 30 cm tall, stems 30-100 cm long, bent. Ligules 0.5-1.4mm. Leaf blades flat 3-28 cm long, 3-7.2mmm wide. Flower spikes 3-5 cm long, consisting of stiff spiny burs. Florets 2-4 per group, 3.5-5.9mm. Glumes 1-5mm long.

Phenology: Flowers June-August.

Habitat: Sandy areas, disturbed places. Sandhill shrubland.

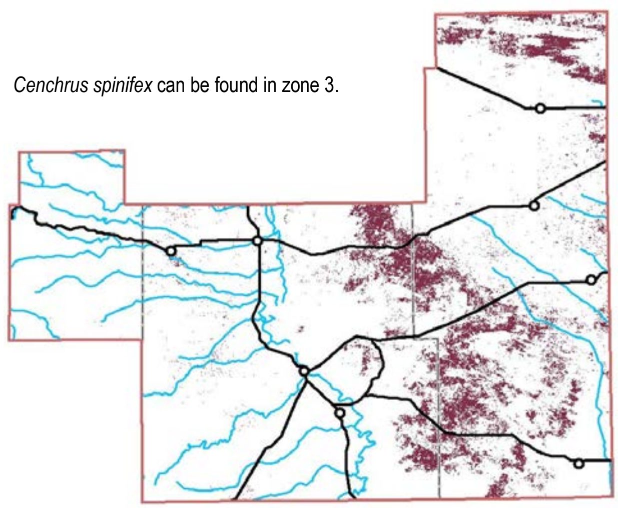
No recorded uses.

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Coastal Sandbur

Cenchrus spinifex can be found in zone 3.



Coastal Sandbur—close-up floret and seed

Coastal Sandbur

Chloris cucullata Bisch. (CHCU2)
Hooded Windmill Grass

Medium grass with flower spikes radiating like fingers from a hand.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				

Botanical Description: Perennial grass, tufted. Stems flattened, erect, 15–60 cm tall, fringed joints. Ligules tiny. Leaf blades up to 20 cm long, 2–4 mm wide, keeled or folded, hairy edges clasping stems. Flower spikes with 10–20 branches in several closely spaced whorls, branches 2–5 cm, spreading, with 14–18 florets per cm. Glumes 0.5–1.5 mm. Florets are conspicuously inflated, spherical.

Phenology: Flowers during the summer.

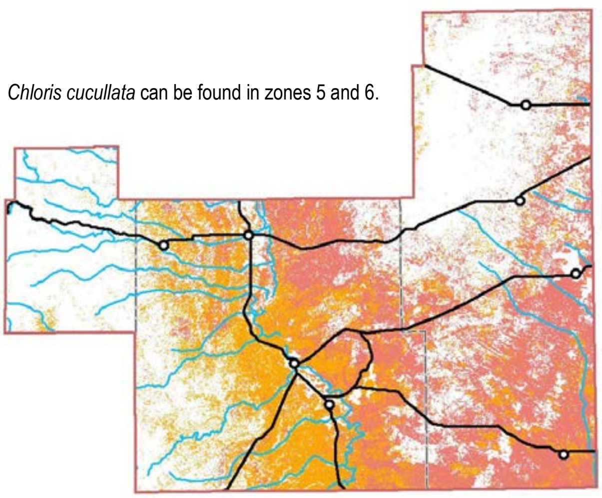
Habitat: Common along roadsides, disturbed areas. Mesquite Scrub, Chihuahuan Semi-Desert Grassland.

No recorded uses.

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Chloris cucullata can be found in zones 5 and 6.



Hooded Windmill

Hooded Windmill -flower

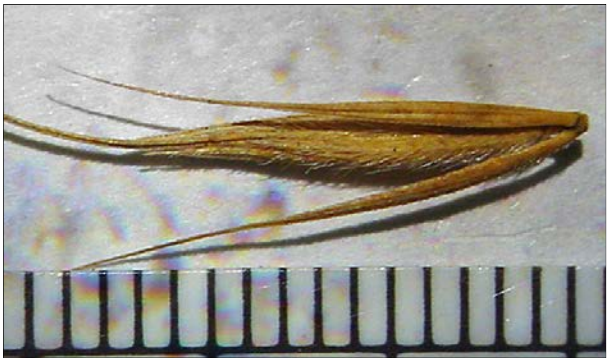
Hooded Windmill -flower

Hooded Windmill -flowers

Hooded Windmill -flowers


Canada Rye Grass


Canada Rye Grass –flower


Canada Rye Grass –seed

Elymus canadensis L. (ELCA4)
Canada Rye Grass, Canada Wildrye

Medium grass, thick flower spikes with very long awns.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x					

Botanical Description: Loosely clumped, sometimes with spreading roots. Stalks erect, 60–150 cm, with 4 to 10 nodes mostly concealed by the leaf sheaths, smooth. Leaves 4–15 mm wide, usually firm, somewhat rolled, dull green becoming grayish. Flower spikes dense, bushy, 6–30 cm long, 3–7 cm wide, usually nodding, usually with two spikelets per node. Spikelets 12–20 mm long excluding the awns, with 3–5 florets. Awns long, up to 5 cm long.

Phenology: Flowers May to July.

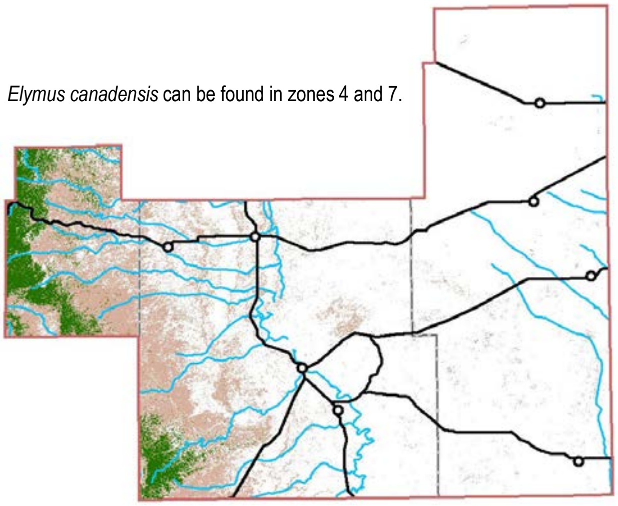
Habitat: Mountains, riparian woodlands, common in disturbed areas.

Uses: Food—Rye produces edible grains. It has also been used extensively as animal forage.

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Elymus canadensis can be found in zones 4 and 7.



Eragrostis lehmannii Nees (ERLE)
Lehmann Lovegrass

Medium grass with chevron-shaped flower spikes, forming continuous stands.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				

Botanical Description: Perennial grass, tufted but forming almost continuous stands. Stems erect, 40–80 cm tall. Ligules tiny, hairy. Leaf blades 2–12 cm long, 1–3 mm wide. Flower spikes 7–18 cm long, 2–8 cm wide, open, branches 1–8 cm long. Many florets (4–12) are compressed together into an elongate "chevron" (stacked V-shape) 5–12 mm long. Glumes 1–2 mm.

Phenology: Greens up early in the year, flowers opportunistically with sufficient rain.

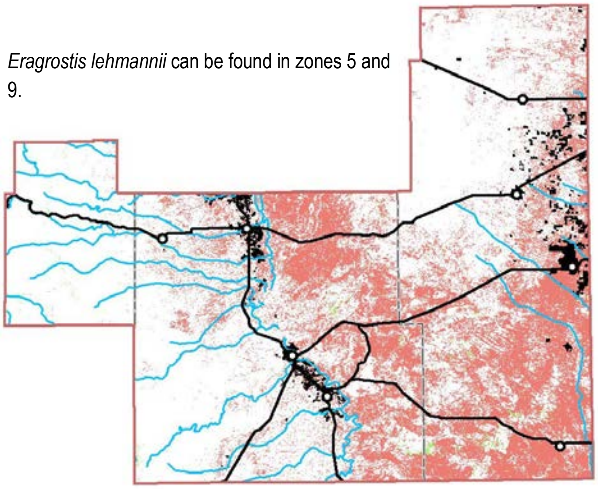
Habitat: Sandy soils along highways and throughout the region, forming large monocultures, especially in Sandy Plains Semi-Desert Grassland. This species has been extensively seeded following eradication of mesquite and shinnery oak on the plains east of Carlsbad.

No recorded uses.

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Eragrostis lehmannii can be found in zones 5 and 9.



Lehmann Lovegrass –dry flowers

Lehmann Lovegrass

Lehmann lovegrass is native to the southern African savannah and was introduced to the Southwest for erosion control. It can out-compete native grasses, forming large monocultures.

Lehmann Lovegrass –stems

Lehmann Lovegrass –flower

Bush Muhly

Bush Muhly

Bush Muhly –flower

Bush Muhly –seed

Muhlenbergia porteri Scribn. ex Beal (MUPO2)
Bush Muhly

Very thin and bushy, growing into a tangled ball, usually associated with shrubs.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				

Botanical Description: Perennial grass, loosely tufted and distinctly bushy. Stems 25–100 cm tall, erect, with “elbows,” wiry, freely branched. Ligules 1–2.5 mm. Leaf blades 2–8 cm long, 0.5–2 mm wide. Flower spikes 4–14 cm long, open, usually purple, with branches 1–7 cm long and solitary florets at the ends of 2–13 mm long branchlets. Florets 3–4.5 mm long, glumes 2–3 mm.

Phenology: Flowers summer.

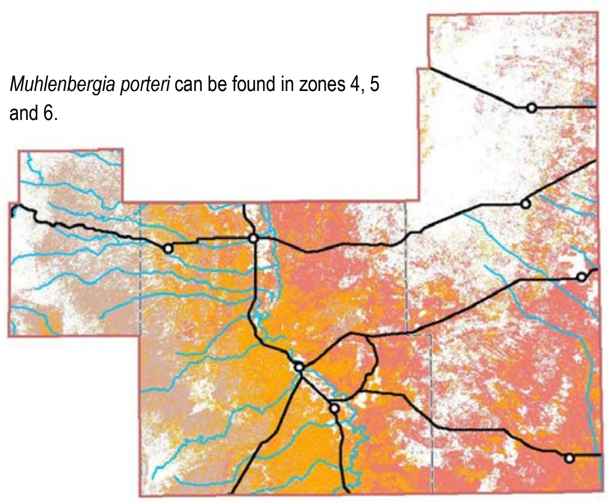
Habitat: Throughout Chihuahuan Desert Scrub and Mesquite Scrub, usually growing out through shrubs, especially mesquite.

No recorded uses.

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Muhlenbergia porteri can be found in zones 4, 5 and 6.



Muhlenbergia wrightii Vasey ex J.M. Coult. (MUWR)
Spike Muhly

Dense "bottlebrush" flower spikes.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Leaves	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Perennial tufted grass. Stems 15–60 cm tall, erect. Ligules 1–3mm. Leaf blades 1.4–12 cm long, 1–3 mm wide. Flower spikes dense, 5–16 cm long, 0.2–1.2 cm wide. Glumes 1 mm.

Phenology: Flowers summer.

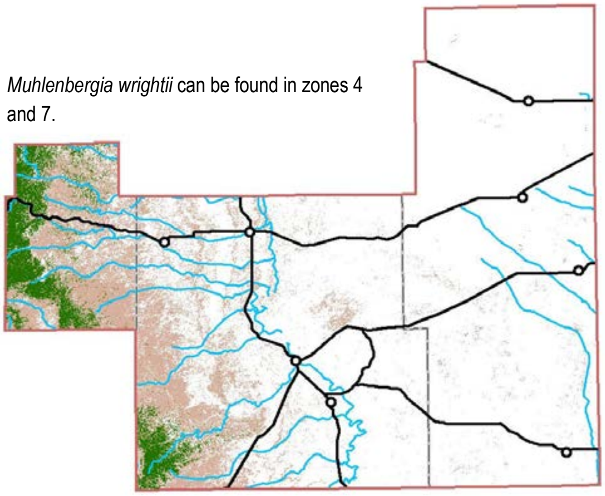
Habitat: Pinyon-Juniper savanna in the foothills and mountains.

Similar Species: ***Muhlenbergia pauciflora*** occurs in similar habitats farther north. ***Muhlenbergia porteri*** is a common grass with a diffuse growth form, often found growing in bushes in Mesquite uplands and Chihuahuan Semi-Desert Grasslands. ***Muhlenbergia arenicola*** is a common grass on sandy areas.

Food: An important plant for baking mescal when beargrass (*Nolina* sp., the preferred choice because it can better handle the heat), was unavailable (Castetter and Opler 1936). Spike muhly was placed over the crowns, and then hot stones were laid on top to bake the mescal.

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.



Muhlenbergia wrightii can be found in zones 4 and 7.

Spike Muhly

Spike Muhly –flower

Spike Muhly –flower

Panicum obtusum Kunth (PAOB)
Obtuse Panic Grass, Vine Mesquite

A short grass with a distinct brownish tan color and large round seeds.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Leaves			x	x	x	x						
Seed			x	x	x	x	x					


Obtuse Panic Grass


Obtuse Panic Grass –flower spike


Obtuse Panic Grass –seed


Obtuse Panic Grass –seed


Obtuse Panic Grass –florets

Botanical Description: Perennial grass spreading by horizontal stems, these often 1 m or more in length, with swollen, densely hairy nodes. Stems branching, leaves occur on opposite sides of the stem. Leaf sheath mostly open, hairy. Leaf blades 2–10 mm wide, flat, with blue-white waxy coating that can be rubbed off. Flower spike with 2–10 branches and large round seeds.

Phenology: Flowers summer.

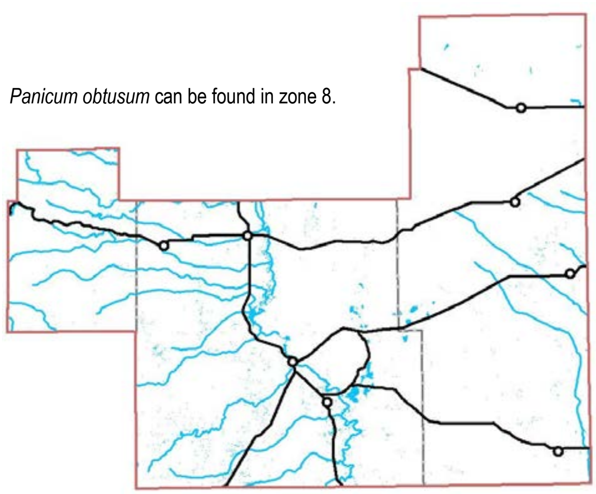
Habitat: Swales and other wet areas; Warm Desert Wash.

Food: Seeds were threshed, winnowed, ground, and made into flour and used to make bread. Mescalero Apache also ground the seeds to make gravy and mix with meat (Castetter and Opler 1936).

Medicine: Although no documentation was found that indicates SE NM Native peoples used this plant for medicinal purposes, vine mesquite is considered a good dermatological aid to help the hair grow. The stolons were also ground to wash hair (Jones 1931).

Storage: Dried seeds could be stored for several years.

Archaeology: One panicoid grass caryopsis has been recovered archaeologically in the CFO region.


Panicum obtusum can be found in zone 8.

Phragmites australis (Cav.) Trin. ex Steud. (PHAU7)
Common Reed

A very tall grass that grows along the shores of rivers and lakes.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Leaves				x	x	x						
Root				x	x	x						
Stem				x	x	x						


Common Reed

Botanical Description: Large perennial aquatic grass. Stems 1–4 m tall, 0.5–1.5 cm thick, erect. Ligules 1 mm. Leaf blades 15–40 cm long, 2–4 cm wide, eventually breaking off of the perennial stem. Spreads by thick aboveground and belowground roots, forming thickets.

Phenology: Flowers summer.

Habitat: Shores of rivers and lakes.

Similar Species: Both native and introduced varieties of this species occur. Leaf sheaths of the native variety fall off in the fall or are easily removed, whereas leaf sheaths stay on or are difficult to remove in the introduced variety. Johnsongrass (***Sorghum halapense***) is a common nonnative grass, similar to common reed, but usually shorter overall. It grows along roadside ditches.


Common Reed –flowers

Fiber: The canes were used to construct canoes, roofs, and drying mats. Segments of the stalk were used to store pollen, powdered ochre, and other important ceremonial powders.

Food: Tender young shoots were baked, boiled, or roasted (Tull 2013). A sugar is excreted by aphids and dries on the leaves and in the stem. It was collected from harvested stalks by pounding and sifting the resin from the fiber. However, this practice has only been documented from groups along the Colorado River (Heiser 1945).

Medicine: White Mountain Apache used the root to treat digestive pain and diarrhea (Reagan 1928).

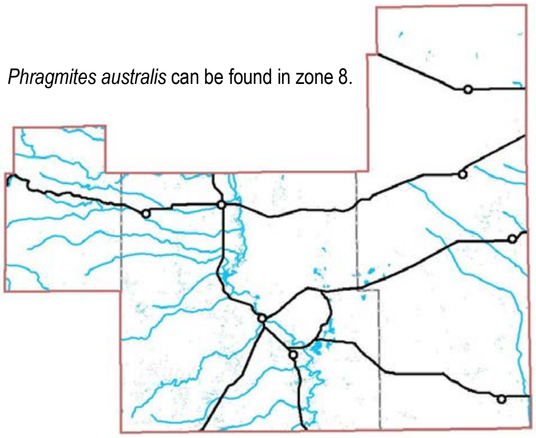
Pipe: The canes were also used for pipe stems or cane cigarettes, for smoking *Nicotiana obtusa* (wild tobacco) or juniper (Reagan 1928).

Use: This cane-like grass was used to make musical instruments, weapons, and containers, as well as food, medicine, and games.

Weapons: White Mountain Apache used the reeds as arrow shafts for bird hunting (Reagan 1928).

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.


Phragmites australis can be found in zone 8.


Common Reed –flowers

Pleuraphis mutica Buckley (PLMU3)
Tobosagrass
(syn: Hilaria mutica)

Coarse gray-green bunchgrass of swales.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				

Tobosagrass

Tobosagrass – stem

Tobosagrass – flower

Botanical Description: Also called ***Hilaria mutica.*** Perennial grass forming continuous stands spreading by roots. Stems 30–60 cm, erect, the bases sprout from a thick, woody rootstock. Ligules 0.5–2 mm. Leaf blades mostly basal, stiff, 2–15 cm long, 2–4 mm wide, rough on both surfaces. Flower spikes 4–8 cm long, white or straw-colored. Florets are in clusters of three. Glumes fan-shaped, broadest at the top. After seeds fall the stems have a distinctive curvy zigzag shape. Leaves are a distinctive gray color when dormant.

Phenology: Flowers summer.

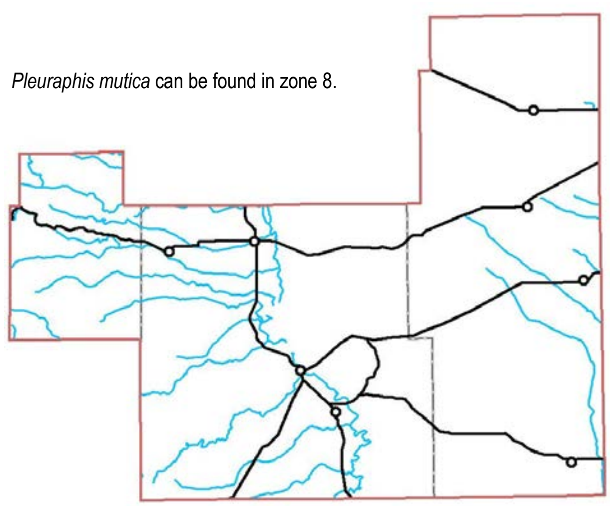
Habitat: Chihuahuan Semi-Desert Grassland. Swales, depressions, and anywhere with fine-textured soils.

No Recorded Uses.

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Pleuraphis mutica can be found in zone 8.



Schizachyrium scoparium (Michx.) Nash (SCSC)
Little Bluestem

A reddish grass with white fuzzy seedheads.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Fiber	x	x	x	x	x	x	x	x	x	x	x	x
Flower						x	x	x				
Stem	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Large perennial grass, often greenish to purplish, sometimes with a white waxy coating that can be rubbed off. Open sheaths. Stems 7–210 cm tall, erect, usually 1–3 mm thick, flattened near the base. Ligules 0.5–2 mm. Leaf blades 7–100 cm long, 1.5–9 mm wide. Flower spikes 2–8 cm long.

Phenology: Flowers during summer.

Habitat: Growing on finer-textured soil, often seen along highways where it receives extra moisture runoff.

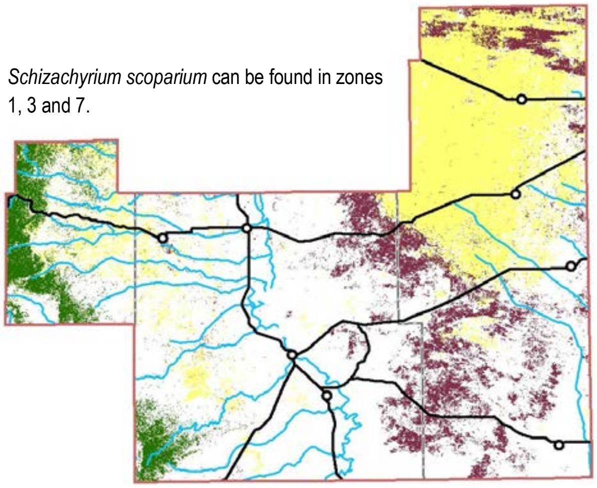
Similar Species: *B. bothriochloa* has shorter branches with less flowers clustered at the tips of the stems. *Andropogon* is also closely related.

No Recorded Uses.

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Schizachyrium scoparium can be found in zones 1, 3 and 7.



Little Bluestem

Little Bluestem

Little Bluestem –seed

Setaria leucopila (Scribn. & Merr.) K. Schum. (SELE6)
Streambed Bristlegrass

A bright green grass in swales.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				

Botanical Description: Perennial bunchgrass spreading by roots. Stems 20–100 cm tall, exceeding the basal leaves, fringed knees. Ligules 1–2.5 mm, hairy. Leaf sheaths open, hairy leaf margins along clasped stem. Leaf blades 8–25 cm long, 2–5 mm wide, rough on both the top and bottom surface. Flower spike cylindrical, dense, 6–15 cm long, pale green, with bristles 4–15 mm.

Phenology: Flowers summer.

Habitat: Wetter swales, often with *Panicum obtusum*; Warm Desert Washes.

No Recorded Uses.

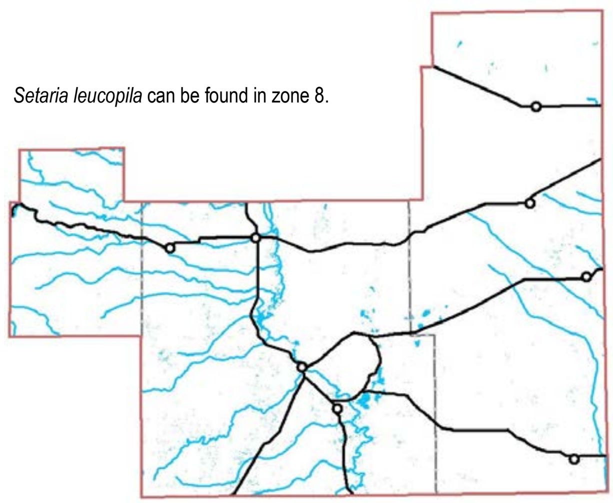
Storage: Dried seeds could be stored for several years.

Archaeology: One seed has been recovered archaeologically in the CFO region.

Streambed Bristlegrass

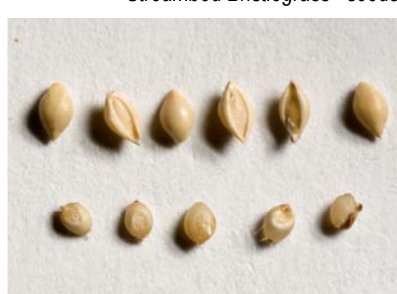
Streambed Bristlegrass –flower

Streambed Bristlegrass –flower & stem



Setaria leucopila can be found in zone 8.

Streambed Bristlegrass –seeds



Streambed Bristlegrass –florets

Sporobolus airoides (Torr.) Torr. (SPAI)
Alkali Sacaton

A large ring bunchgrass forming monocultures in depressions.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Leaves	x	x	x	x	x	x	x	x	x	x	x	x

Alkali Sacaton

Botanical Description: Perennial bunchgrass. Stems 35–120 cm tall, stout, the base thick and tough, almost woody in texture. Ligules tiny, inconspicuous. Leaf blades fibrous, 10–45 cm long, 2–5 mm wide, green or gray–green. Open flower clusters 15–45 cm long, 15–25 cm wide, diffuse, with branches 1.5–13 cm long, florets 1.3–2.8 mm, yellow, purplish, or greenish.

Phenology: Flowers summer.

Habitat: Wetter swales, especially with high salt concentrations (look for salt crusts on soil); Warm Desert Wash and Playas.

Alkali Sacaton –stem

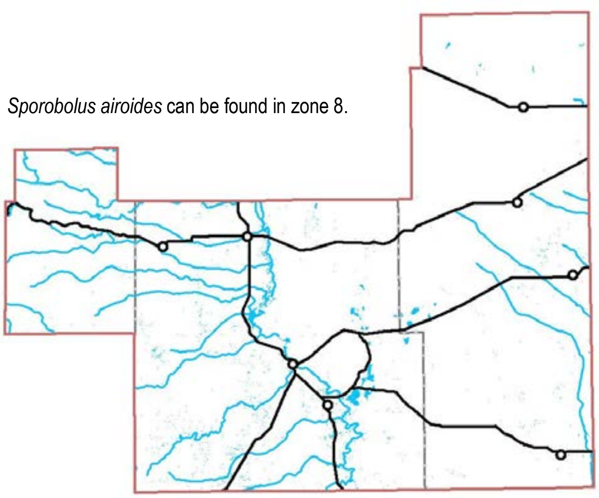
Container: Moist grass was laid on hot stones to keep steam from escaping while mescal crowns were baked on top of the grass/hot stones (Castetter and Opler 1936).

Storage: Dried seeds could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Alkali Sacaton –flower

Sporobolus airoides can be found in zone 8.



Sporobolus cryptandrus (Torr.) A. Gray (SPCR)
Sand Dropseed

A medium grass with flowers partially hidden by upper leaf sheath and hairy nodes.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Seed									x	x	x	

Botanical Description: Perennial bunchgrass, stems 30–100 cm tall, 1–3.5 mm thick. Sheaths with conspicuous tufts of hairs up to 4 mm long. Ligules inconspicuous. Leaf blades 5–26 cm long, 2–6 mm wide. Flower spikes 15–40 cm long, 2–12 cm wide, initially contracted and spike-like, partially hidden in the uppermost sheath, ultimately open, with branches 0.6–6 cm, lower branches longest. Florets 1.5–2.5 mm, brownish, gray, or purple-tinged. Old stalks turn gray and shreddy.

Phenology: Flowers summer.

Habitat: Widespread, Chihuahuan Semi-Desert Grassland, Chihuahuan Desert Scrub, Great Plains Shortgrass Prairie.

Similar Species: ***Sporobolus flexuosus*** is similar to *S. cryptandrus* but is usually bent, the messy flower branches tangle with neighbor plants; when in doubt, run your hand up the stem over the flowers. *S. flexuosus* branches point backwards along the stem and will snag your hand, whereas *S. cryptandrus* will feel smooth. *S. flexuous* is the characteristic species of Sandy Plains Semi-Desert Grassland.

Food: Widely used as a wild crop because the small grains can be gathered in large quantities where plants are common (Tull 2013). Seeds boiled and eaten as porridge by the Chiricahua and Mescalero. (Castetter and Opler, 1936.)

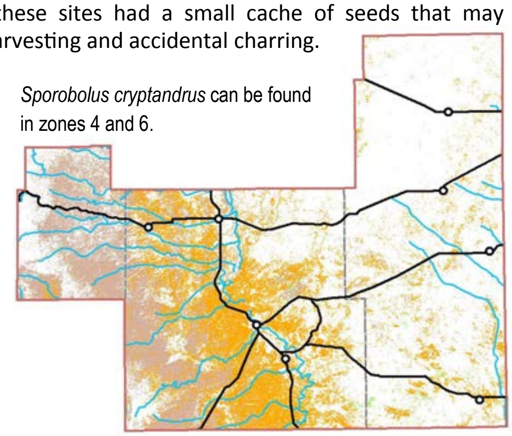
Storage: Dried seeds could be stored for several years.

Archaeology: *Sporobolus* seeds have been recovered from four sites in the CFO region, in the Early and Late Formative. One of these sites had a small cache of seeds that may reflect harvesting and accidental charring.

Sand Dropseed—leaves

Sand Dropseed—flowering spike

Sand Dropseed –florets on branches



Sporobolus cryptandrus can be found in zones 4 and 6.

Sand Dropseed –close-up of florets on branch

Sporobolus giganteus Nash (SPGI)
Giant Dropseed

Large grass (1–2 m tall) with contracted flowers in a spike.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Seed									x	x	x	
Stem	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Perennial grass with stems 1–2 m tall, 4–10 mm thick near the base. Ligules 0.5–1.5 mm. Leaf blades 10–50 cm long, 4–10 mm wide, flat, smooth on both sides. Flower spikes at the top of branches, 25–75 cm long, 1–4 cm wide, dense, usually included in the uppermost leaf sheath. Florets 2.5–3.5 mm, whitish to gray. Old stalks turn gray and shreddy.

Phenology: Flowers summer.

Habitat: Confined to sandy soils, Sandhill Shrublands.

Similar Species: ***Sporobolus contractus*** is much shorter and less robust, but with a similar contracted panicle. ***Calamovilfa gigantea*** is another robust grass growing on sand dunes in the region. It has spreading panicles, hairy florets, and can reach a height of 2.3m.

Food: The seeds are edible (Doebley, 1984).

Storage: Dried seeds could be stored for several years.

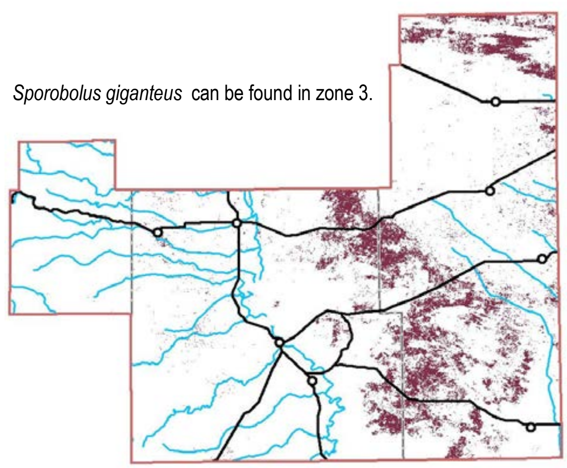
Archaeology: This taxon has not been found in the CFO region.

Giant Dropseed –basal leaves

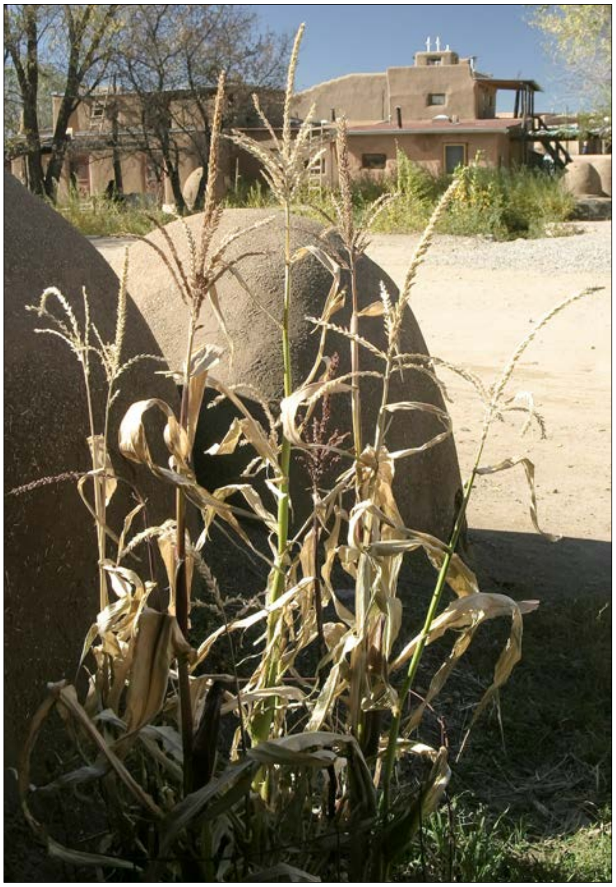
Giant Dropseed—seeds

Giant Dropseed –leaves

Giant Dropseed—flowering spike



Sporobolus giganteus can be found in zone 3.



Maize

Maize –corn cobs

Zea mays L. (ZEMA)
Maize, Corn

Large grass (1–3 m tall) with corn cobs.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x					
Seed								x	x	x		

Botanical Description: Annual grass, stems 1–3 m tall, 1–5 cm thick, with nodes every 18 cm. Leaf blades mostly 30–90 cm long, 2.5–12 cm wide. Female flowers included in leaves, 4–30 cm long, 1–10 cm thick, with rows of seeds on a cylindrical cob. Male flowers appear as tassels at the top of the stem.

Phenology: Flowers June to September.

Habitat: Cultivated cropland.

Similar Species: Stem has appearance of a bamboo cane; *Phragmites australis* could be confused with this species but is much taller and grows along rivers, not in cropland. Maize has solid stems whereas *Phragmites* has hollow stems.

Food: Maize has been and continues to be one of the most important dietary staples; however, the Mescalero and Lipan Apache did not rely on maize to the same degree as other Native peoples (see text box on next page). Many traditional foods were prepared from corn. Hominy is made of roasted maize kernels. Ashes of juniper were sometimes added as a form of lime. Corn was eaten right off the cob or it was ground to make a gravy.

Storage: Dried seeds could be stored for several years.

Archaeology: The story of maize in the CFO region has only begun to be investigated archaeologically. There are two main types of evidence for identifying maize in the ancient sites: macro- and microbotanical remains. Macrobotanical

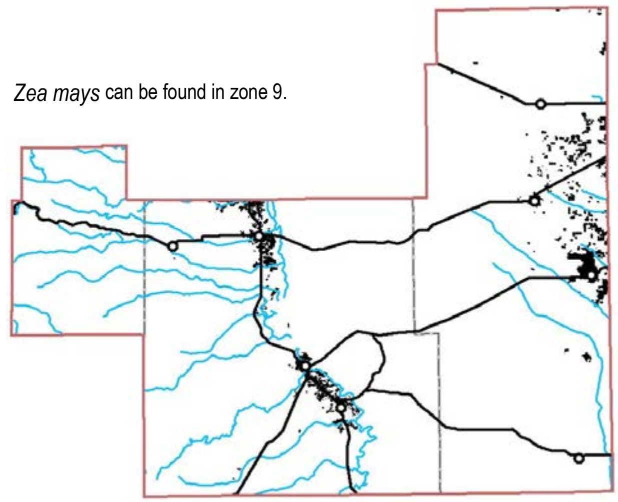
Maize –corn ear with female flower

Zea mays L. (ZEMA)
Maize, Corn

(continued)

Zea mays—tassel, ear, seed, and cob anatomy

Zea mays can be found in zone 9.



remains are considered the most reliable, given that the morphology of phytoliths and starch overlap with other species of grass. There have been identifications of carbonized maize cupules and kernels from four sites, in the Early and Late Formative, near water sources (such as the Penasco River, playas, and draws).

Twenty-six sites have either phytoliths, starch, or residues that may have derived from maize. There is no evidence for maize before the Late Archaic, with six sites having probable maize evidence (most are from microbotanical remains). From the Early Formative there are eight sites and from the Late Formative there are nine sites. The remaining four are from the Post Formative or cannot be assigned a time period.

Of the 364 sites in the sample for the CFO region so far, about 8% have a hint of maize use. It would be prudent to interpret the evidence so far as coming from trade or small-scale cultivation.

Lipan Apache Maize Cultivation

Stella Lapaz was interviewed by Opler in 1935. She described the traditional ethnobotanical uses of maize by her people, the Lipan Apache:

The old timers used to say that when they found a level place beside a stream it was a good place to plant [maize]. In those days they didn't think about burning the brush down or girdling the trees to make a clearing. They just looked for a level place and raised a little corn there.

They planted only about two or three rows. If they were around near it, they used to carry water over to the field in a water bucket and put some on. They did that if they were still around near. But usually they didn't stay near it. They didn't care much about it. If nothing bothered it before they came back, they would have a little corn.

The Jicarilla could farm because they stayed in one place. But the Lipan were different. They went all over. They never stayed in one place. They kept roaming around almost all the time and couldn't stay around and take care of crops.

Maize—corn kernels

Annual Buckwheat –flower

Eriogonum annuum Nutt. (ERAN4)
Annual Buckwheat

Common sandhills forb with white flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x	x			
Leaves	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: A slender annual forb, 40–100 cm tall, densely wooly-hairy. Leaves in a basal rosette, 1–7 cm long. Flowers in spikes 3–10 cm long by 2–7 cm wide, individual flowers 1–2.5 mm, white to rose colored. Dry seeds 1.5–2 mm long.

Phenology: Flowers July–September.

Habitat: Sandy areas; Sandhill Shrubland, Sandy Plains Semi-Desert Grassland.

Similar Species: ***Eriogonum longifolium*** is similar to *E. annuum* but is perennial and has yellow flowers.

Dye: Leaves were used by the Kiowa to stain buffalo and deer hides (Vestal and Schultes 1939).

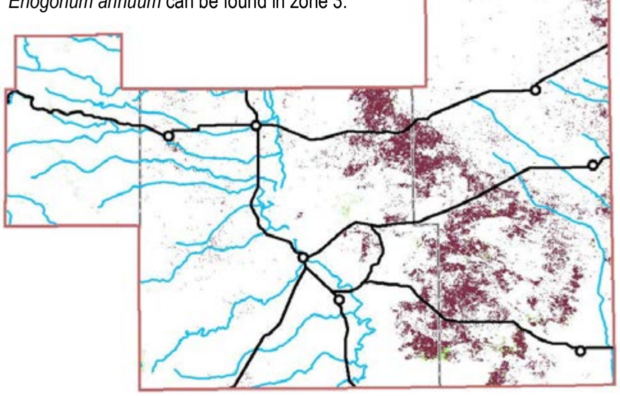
Medicine: "Almost all of our information about using wild buckwheat comes from Native American and Mexican uses. The plants…help the body by slowing secretions, shrinking and soothing inflamed membranes. The tea is a good, reliable eye wash and many of the California Indians use the tea for washing newborns. The flowers are especially diuretic…and have many uses in cases of cystitis and urethritis. The Cahuillas use the tea for dull, nagging pain in pregnancy, especially in the back and hips. This herb's mild astringency makes it useful as a gargle for sore throats under any conditions and in any problem… These are homely and gentle plants, with mild, well-defined uses and no toxicity." (Moore 1941)

Storage: Dried leaves could be stored for several years.

Archaeology: One seed has been found archaeologically in the CFO region from an undated feature. The Polygonaceae were not as important in the Southwest as in other areas of the country.

Eriogonum annuum is known as annual or wild buckwheat. *Polygonum* is known as knotweed, smartweed, bind weed, and a host of other things. In both species the fresh leaves, young leaves, and stems can be used in salads. Young shoots can be prepared like asparagus. For more information about the edible uses of sorrel and wild buckwheat, see Blair (2014): *The Wild Wisdom of Weeds*.

Eriogonum annuum can be found in zone 3.



Annual Buckwheat –seeds

Polygonum lapathifolium L. (POLA4)
Knotweed

A plant with membranous sheaths where the leaves attach, growing in wetlands.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower							x	x	x	x	x	
Leaves			x	x	x	x	x	x	x	x	x	

Botanical Description: Plants annual, 10–100 cm tall. Stems smooth, with brownish membranous sheaths at nodes where leaves branch. Leaves dark green, lance-shaped, 4–12 cm long by 0.5–4 cm wide, smooth or fuzzy on the undersides. Flower spikes at the end of stems, often bent, 3–8 cm long by 0.5–1.2 cm wide; individual flowers greenish white to pink, smooth, four petals 2.5–33 mm long with prominent veins. Dry seeds disk-shaped or triangular, 1.5–3.2 mm by 1.6–3 mm, smooth.

Phenology: Flowers July–November.

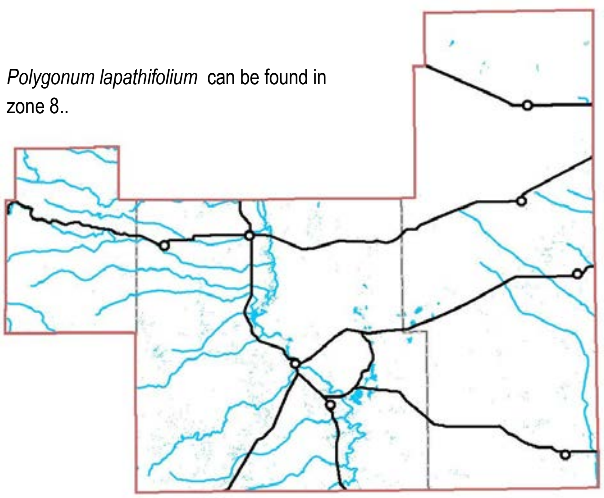
Habitat: Moist areas, stock tanks, ponds, Riparian Woodland and Shrubland.

Food: Some species of *Polygonum* can be eaten raw, but others are so peppery they can raise blisters on the skin. Caution is advised (Tull 2013).

Storage: Dried leaves could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Polygonum lapathifolium can be found in zone 8..



Knotweed

Knotweed -flower and leaf sheath

Knotweed –seed

Polygonum lapathifolium –seeds

Canaigre Dock

Did You Know?

Canaigre is poisonous if not prepared properly. Edible leaves and stems must be boiled in several changes of water. The leaf stalks are an excellent substitute for rhubarb in pies.

Rumex hymenosepalus **Torr. (RUHY)**

Canaigre Dock

Prostrate lancolate leaves with showy red inflorescence.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x								
Leaves		x	x	x								

Botanical Description: Perennial forb, 25–90 cm tall, with tuberous roots. Stems erect, branched above middle, with whitish membranous sheaths at nodes where leaves branch. Leaves oblong or lance-shaped, 8–30 cm long by 2–8 cm wide, edges flat or wavy. Flower spikes on the top half of the stem, narrow. Flowers greenish or reddish white, 5–20 in whorls, petals 11–16 mm long by 9.5–14 mm wide. Dry seeds brown or red, with wings, 4–5 mm by 2.5–4.5 mm.

Phenology: Flowers March–April.

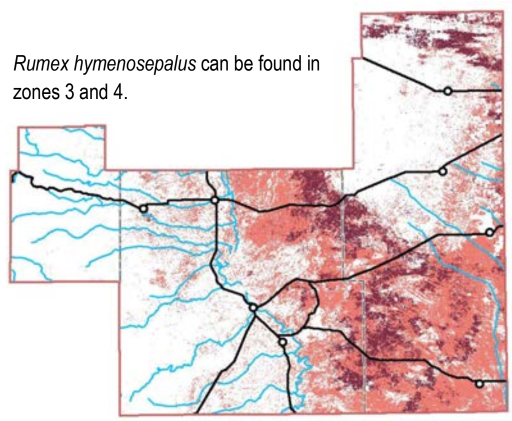
Habitat: Sandy areas; Sandhill Shrubland, Chihuahuan Semi-Desert Grassland.

Food: Leaves eaten without preparation or cooked with green chile and meat or animal bones (Castetter and Opler 1936).

Medicine: Some tribes used the leaves as an analgesic, an aid to reduce rheumatic pain, and as a poultice for wounds and boils. Root extracts were used as a dermatological aid (Smith 1929), and roots were boiled and eaten and applied as a poultice for gastrointestinal issues (Turner 1973).

Storage: Dried leaves and roots could be stored for several years.

Archaeology: *Rumex* has not been found in the CFO region.



Canaigre Dock

Canaigre Dock –flower

Canaigre Dock –flower

Portulaca oleracea L. (POOL)
Purslane, Verdolaga
A succulent, low-growing plant.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x	x			
Leaves					x	x	x	x	x			

Botanical Description: Annual low-growing succulent forb with branches up to 50 cm long. Taproot 2–10 cm long. Leaves smooth, oval, 4–28 mm long by 2–13 mm wide. Flowers yellow, 3–10 mm diameter, five clawed petals. Seeds 1 mm in diameter.

Phenology: Flowers late spring through early fall.

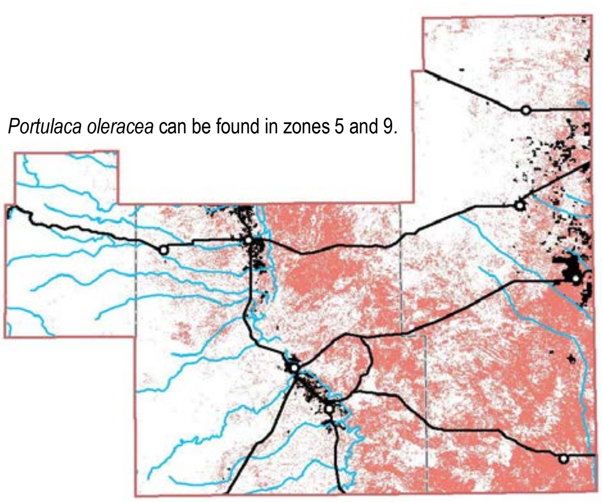
Habitat: Disturbed areas, playa lakes.

Similar Species: ***Portulaca suffrutescens*** has yellowish orange flowers that are much larger than *P. oleracea*, at least 25 mm in diameter, and thin, linear leaves. ***Portulaca pilosa*** has flowers dark pink to purple, small, 5–12 mm in diameter, and pointed leaves. ***Sesuvium verrucosum*** is one of the only other low-growing succulent forbs in the area. It has rose-purple star-shaped flowers about 15 mm in diameter with petals pointed, not clawed as in *Portulaca*. It is also edible, a good salty treat on a hot day. ***Mollugo verticillata*** (Green Carpetweed), is another edible ground cover, with small white flowers, many stems radiating from the base, and many leaves radiating from a node (whorled). It forms a 5- to 10-cm-high tangle in appropriately moist environments.

Food: This low, spreading annual germinates and grows throughout the growing season, providing fresh greens for much of the year. The juicy plant can taste slightly salty and is an excellent addition to salads. It adds gelatin-like texture to pies, and has been used to thicken soups. The entire plant is extremely rich in vitamins, especially A, B, C, E, Q10, and Omega-3 fats. Purslane is 92% water, and would have been an easily accessible source of life-giving liquid in the desert and Llano Estacado, where water sources are far and few between (Blair 2014).

The plant was also gathered in large quantities and dried slowly, then stored and used as greens during the winter. It was often cooked with meat (Warnock 1974).

Portulaca oleracea can be found in zones 5 and 9.



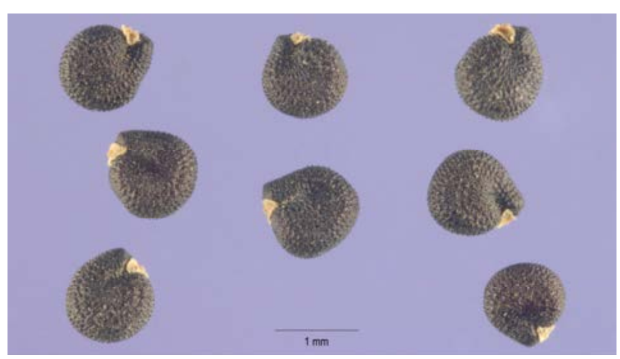
Purslane

Purslane

Medicine: The leaves contain a gelatinous substance with analgesic and anti-inflammatory effects, and was used topically to treat wounds (Chan et al. 2000).

Storage: Dried leaves could be stored for several years.

Archaeology: *Portulaca* seeds have been recovered 11 times in the CFO region, all from undated features and contexts. It was most likely a well used green food item.



Purslane – seeds


Javelina Bush


Javelina Bush


Javelina Bush –flowers

Javelina Bush –fruit

Condalia ericoides (A. Gray) M.C. Johnst. (COER5)
Javelina Bush

Small evergreen shrub with tiny linear leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x				
Fruit								x	x	x		

Botanical Description: Evergreen, densely branching low shrub. Bark gray, branches end in slender spines. Leaves clustered on short branches, alternate, dark-green, linear, edges rolled under. Flowers small, inconspicuous, yellow. Fruits are small, oval reddish-brown to purplish-black berries.

Phenology: Blooms spring–summer.

Habitat: Common on limestone rocky hillsides throughout Chihuahuan Desert Scrub.

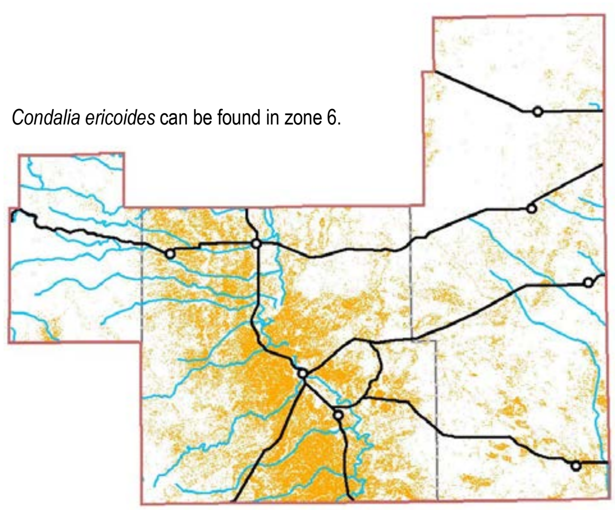
Similar Species: ***Ceanothus greggi***, also in the Rhamnaceae, has pinkish white flowers and occurs in the Guadalupe Mountains above 1,600 m. It has larger leaves and spiny branches.

Food: *Condalia* fruits have been eaten raw or cooked in jellies by Native peoples (Tull 2013).

Storage: Jellied fruit could be stored for several years.

Archaeology: Rhamnaceae and by inference *Condalia* wood has been found in 81 sites across the CFO region. It can be interpreted as an important supplementary wood from the Late Archaic to the Post Formative. One seed has been found in an Early Formative context.

Condalia ericoides can be found in zone 6.



Ziziphus obtusifolia (Hook. ex Torr. & A. Gray) A. Gray (ZIOB)

Lotebush

Spine-tipped branches with tan-gray bark and *opposite* leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x				
Fruit								x	x	x	x	x

Botanical Description: Shrubs to 4 m tall, armed with sharpened branch-tips. Young stems bluish-white, smooth. Leaves opposite, deciduous, linear to oblong, 5–20 mm long by 2–15 mm wide. Flowers inconspicuous, 2–15 per bunch, yellowish green. Fruit blue to purple or black with a white waxy bloom, 3–8 mm long.

Phenology: Blooms spring–summer.

Habitat: Chihuahuan Desert Scrub and occasionally in Chihuahuan semi-desert grasslands.

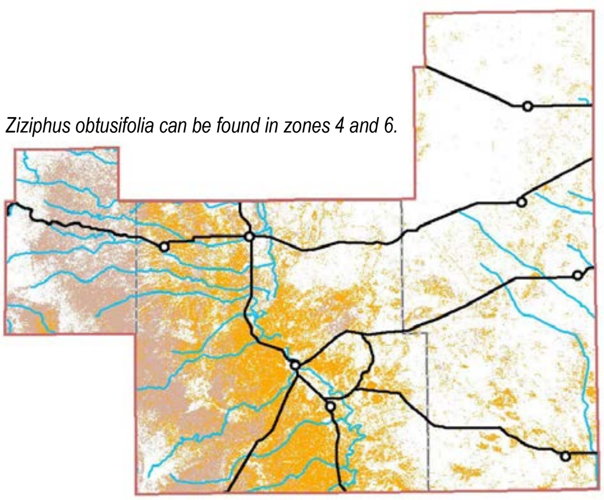
Food: Edible fruit eaten by Native peoples (Tull 2013).

Storage: Dried fruits could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Lotebush –fruit

Lotebush –branches



Ziziphus obtusifolia can be found in zones 4 and 6.

Lotebush –flowers

Lotebush –branches

Apache Plume

Apache Plume – seeds with showy plumes

Apache Plume—closeup of leaf

Fallugia paradoxa (D. Don) Endl. ex Torr. (FAPA) Apache Plume
K'aa'kas (Mescalero Apache)

Deeply lobed leaves and showy fronded seeds.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Fiber	x	x	x	x	x	x	x	x	x	x	x	x
Flower				x	x	x	x	x	x	x	x	
Leaves			x	x	x	x	x	x	x	x	x	
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Dense multi-branched shrub, 2–3 m tall, small dark green leaves, deeply lobed, flowers 2–4 cm wide, five white petals, many yellow stamens. Fruit is an achene with a single seed attached to a long red-hairy "plume" 1–4 cm long, persistent on plant for several months.

Phenology: Flowers in mid-spring to fall, seeds start to appear in late summer.

Similar: Flowers are similar to *Clematis drummondii*, Drummond's clematis, a vine found growing tangled on shrubs, common in desert washes.

Note: The common name was created by James K. Metcalfe, a rancher around the beginning of the 20th century in Western New Mexico.

Uses: Minor uses as a wood for the construction of the Apache cradle board, shavings used in padding, and for basket making. Harvest is limited to preserve stands.

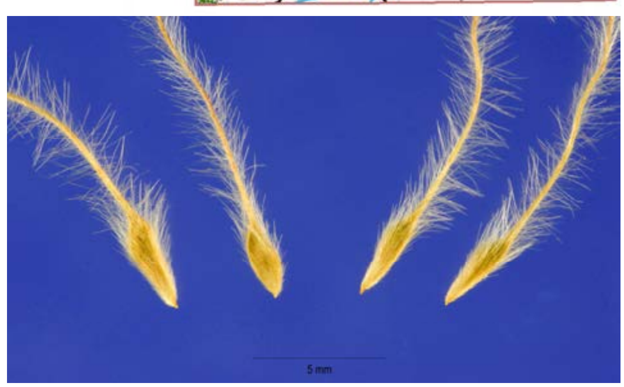
Storage: Wood could be stored indefinitely in the proper conditions.

Archaeology: This taxon has not been found in the CFO region.

Fallugia paradoxa can be found in zone 7.

Apache Plume—flower

Apache Plume—seeds



Apache Plume—seeds

Prunus virginiana L. (PRVI)

Chokecherry

Smooth purple bark, finely toothed leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x						
Fruit							x	x				

Botanical Description: Tree mostly less than 8 m tall, sometimes forming thickets instead of trees, with smooth purplish bark. Leaves 5 cm long and finely toothed. Flowers about 1.5 cm across, white and in spikes. Fruit is a cherry up to 1 cm diameter, red to purplish, edible.

Phenology: Flowers May–June

Habitat: Cultivated, also occasional in the Sacramento Mountains.

Similar Species: ***Prunus serotina*** (black cherry; *dz'e'idilta'l*—Mescalero Apache) has white flowers in longer and thinner spikes. It is found in the Guadalupe Mountains.

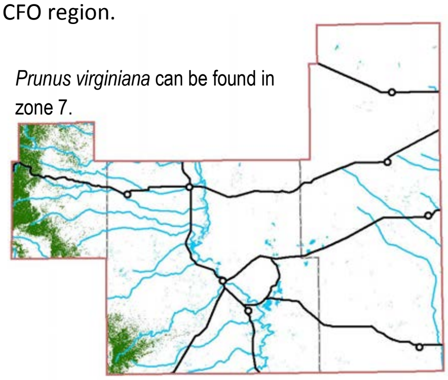
Food: Berries were eaten fresh or ground and formed into cakes and dried for winter (Basehart 1960).

Medicine: Although no documentation was found for Apache use as medicine, cough medicine has been made from bark by other groups (Swank 1932). It was also used to ease labor pains, diarrhea, laryngitis, sore throat, as a blood cleanser, and for stomach cramps (Densmore 1928; Steggerda and Eckardt 1941; Swank 1932). Ripe berries were mashed and used to heal burns (Basehart 1960).

Weapon: Small shoots were used to make arrow shafts (Basehart 1960).

Storage: Wood and bark could be stored indefinitely in the proper conditions.

Archaeology: A *Prunus* seed and twig have been found in two sites in the CFO region.




Chokecherry –seeds cases


Chokecherry –leaves


Chokecherry –branch


Chokecherry – flowers

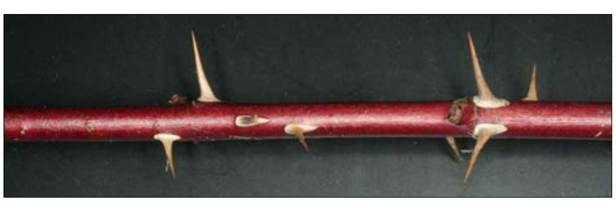

Chokecherry –developing flowers

Woods' Rose –leaves

Woods' Rose –branch & fruit

Roses are a large family of mostly shrubs and trees of higher latitudes and mountains. Only a few species from the family occur in the CFO region, where they are most commonly encountered in cultivation.

Woods' Rose –flower



Woods' Rose –stem with thorns

Rosa woodsii **Lindl. (ROWO)**

Woods' Rose

A shrub with thorns and finely toothed leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x			
Fruit	x	x								x	x	x

Botanical Description: Many-branched shrub with curved thorns, up to 3 m tall, forming thickets. Deciduous leaves with sharp-toothed leaflets. Clusters of fragrant flowers with five petals, white-pink, up to 5 cm diameter. Fruit is a rose hip, red, up to 1 cm long.

Phenology: Flowers June–September.

Habitat: Occurs above 2,000 (6,000 feet) in the Guadalupe Mountains.

Similar Species: *Rosa stellata* is the common mountain rose in the Sacramento Mountains.

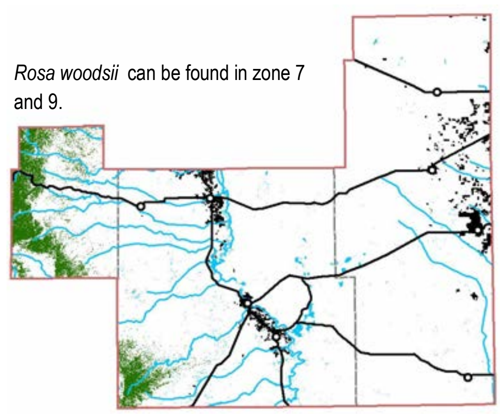
Beverage: An infusion high in Vitamin C can be made by pouring boiling water over ripe rose hips (Tull 2013).

Food: Rose hips were eaten (Castetter 1935). Ripe fruits can be eaten raw, dried, candied, or made into preserves. The hairs in raw fruit can irritate the digestive system. Flower petals are also edible. Rose pulp was squeezed into water and made into jelly (Castetter and Opler 1936).

Medicine: Some Native peoples used this for ceremonial medicine (Turner et al. 1980). It has also been made into a poultice of chewed leaves and applied to bee stings, burns, and boils (Turner et al. 1980). A decoction was prepared for diarrhea, urinary issues, and for coughs (Train et al. 1941). The seeds have also been used to produce a drawing effect for muscular pains (Nickerson 1966).

Storage: Wood could be stored indefinitely in the proper conditions.

Archaeology: This taxon has not been found in the CFO region.



Woods' Rose –seeds

Populus deltoides Bartram ex Marsh. ssp. wislizeni (S. Watson) Eckenwalder (PODEW)
Rio Grande Cottonwood
T'iis (Mescalero Apache)

A riparian tree with thick bark and triangular or deltoid-shaped leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Bark	x	x	x	x	x	x	x	x	x	x	x	x
Bud				x	x	x	x	x	x	x		
Flower			x	x								
Leaf				x	x	x	x	x	x	x		
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Large tree up to 55 m tall, 3.5 m diameter, often with 2 or more trunks near base. Bark is light brown, deeply furrowed. Branches are yellow-brown, becoming tan. Buds are greenish yellow. Leaves 3–9 cm diameter, triangular or heart-shaped, with 5–15 teeth on each edge. Seeds surrounded by a cottony fluff.

Phenology: Flowering late March to April before the leaves appear.

Habitat: Riparian Woodlands and Shrublands.

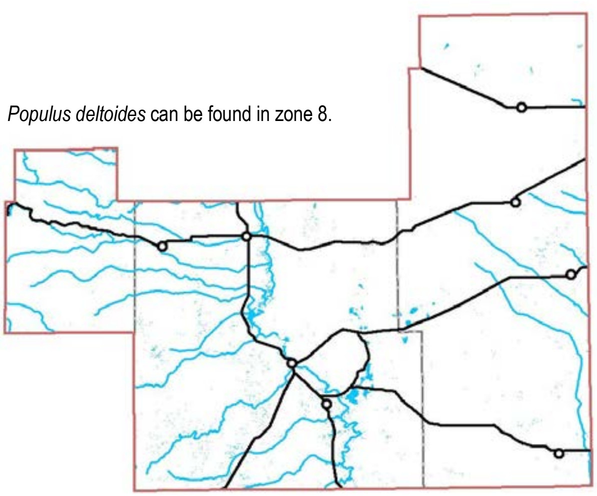
Food: Rio Grande cottonwood buds were used as chewing gum (Castetter 1935).

Medicine: Although no documentation was found for medicinal use by CFO-region indigenous cultural groups, cottonwood has been used by other Native people. A handkerchief was soaked in an infusion of bark and leaves and tied around the head to reduce headaches. A poultice was made of boiled bark and leaves for sore muscles or sprains, to wash broken limbs, and as a wash for cuts (Bean and Saubel 1972; Zigmond 1981).

Storage: Wood, bark, and leaves could be stored indefinitely in the proper conditions.

Archaeology: This taxon has not been found in the CFO region.

Populus deltoides can be found in zone 8.



Rio Grande Cottonwood

Willow and cottonwood branches can be distinguished by the number of bud scales; cottonwood has multiple scales on new buds whereas willows have a single large scale capping new buds.

Rio Grande Cottonwood –leaves & cottony seeds

Rio Grande Cottonwood –flower buds

Coyote Willow

Coyote Willow –flower

Coyote Willow –seeds with cottony hairs

Salix exigua Nutt., (SAEX) Coyote Willow, Narrowleaf Willow *Tuug' u' u line* (Mescalero Apache)

A riparian shrub with numerous stems growing from the ground with narrow leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Bark	x	x	x	x	x	x	x	x	x	x	x	x
Flower			x	x								
Leaves	x	x	x								x	x
Stem	x	x	x								x	x

Botanical Description: Shrubs up to 3 m tall, spreading from roots in dense stands. Stems and branches gray-brown, red-brown, or yellow-brown. Leaves linear, 30–136 mm long by 2– 4 mm, at least 6.5 times as long as wide. Flowers occur in spikes called catkins. Seeds are covered in dense hairs.

Phenology: Flowers in the early spring after leaves appear.

Habitat: Riparian Woodlands and Shrublands.

Construction: Willow stems are long, straight, and flexible, and were used to make baskets and in the construction of houses and sweat lodges. The bark was used to tie poles or other items together.

Food: Bark and flowers were eaten by some Native peoples.

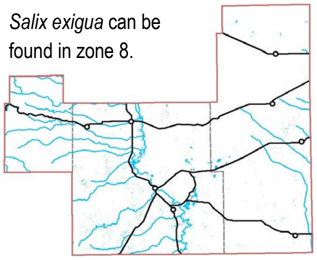
Clothing: During summer months, a round shade for the head was made of willow by the Lipan Apache (Opler 1935).

Medicine: Willows contain the same active ingredient as aspirin (salicylic acid), which acts to reduce fever and inflammation. Willow bark, leaves, and twigs were used for many medicinal applications, especially for sore throats (Moore 2003).

Weapons: Arrows were made from straight, thin stems.

Storage: Wood, bark and leaves could be stored indefinitely in the proper conditions.

Archaeology: This taxon has not been found in the CFO region.



Salix exigua can be found in zone 8.

Coyote Willow –leaves

Sapindus saponaria L. (SASA4)
Wingleaf Soapberry, Western Soapberry

A tree with delicate compound leaves and translucent gel-filled berries.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x							
Fruit	x						x	x	x	x	x	x
Root	x	x	x	x	x	x	x	x	x	x	x	x
Sap						x	x	x	x	x	x	x
Wood	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Tree to 6 m tall, deciduous. Gray bark. Buds, young leaves, and twigs densely hairy. Leaves are compound, 10–28 cm long, leaflets 6–19 per leaf, each 4–12 cm long and 0.5–2.0 cm wide. Stem between leaflets is often winged. Flowers are 15–26 cm long branching spikes, yellowish green, tiny. Fruit 1.0–1.5 cm diameter, translucent amber pulp surrounding a single seed 8–10 mm diameter, smooth.

Phenology: Flowers in the late spring, producing fruit in late summer. The fruit often persists on the tree through the winter, becoming more and more wrinkled as it dries out.

Habitat: A common small tree or shrub growing incongruously in the middle of sand dunes. Also found along roadsides, and forming taller stands around water sources including old windmills and water tanks.

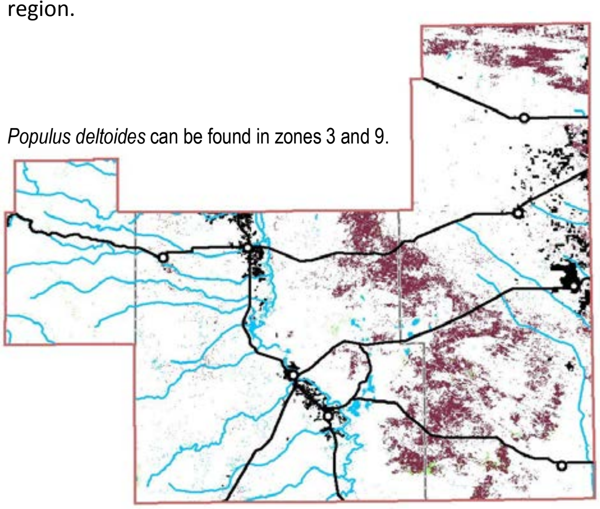
Medicine: The sap was used by the Kiowa for soothing wounds (Vestal and Schultes 1939). Ethnobotanist Michael Moore states (1989) that a tea of the leaves is "one of our better arthritis remedies for internal use" because it is anti-inflammatory and analgesic.

Soap: Berries contain saponins and can be used as soap and also to poison fish.

Weapons: Flexible young branches were used to make (toy) arrows (Carlson and Jones 1940).

Storage: Wood, leaves, and berries could be stored indefinitely in the proper conditions.

Archaeology: This taxon has not been found in the CFO region.



Populus deltoides can be found in zones 3 and 9.

Wingleaf Soapberry –branch

Wingleaf Soapberry –fruit

Wingleaf Soapberry –flowers

Wholeleaf Indian Paintbrush

Wholeleaf Indian Paintbrush

Wholeleaf Indian Paintbrush

Castilleja integra A. Gray (CAIN14)
Wholeleaf Indian Paintbrush

A showy orange wildflower in the foothills.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x	x					
Roots	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Perennial with stout stems and linear leaves. Leaves smooth on the upper surface and densely hairy on the undersides. Stems also hairy or wooly, gray. Flowers are orange-red.

Phenology: Flowers April–July.

Habitat: Pinyon-Juniper woodland.

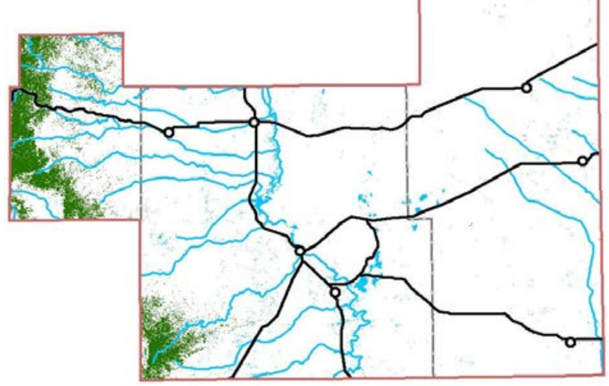
Similar Species: *C. sessiliflora*. In Mixed Desert Thornscrub. It has pale yellow flowers.

Dye: Apache peoples used the root sheaths of this plant to color deer skins (Reagan, 1929).

Storage: Dried roots could be stored for several years.

Archaeology: No archaeological Scrophulariaceae plant remains have been identified in the CFO region.

Castilleja integra can be found in zone 7.



Epixiphium wislizeni (Engelm. ex A. Gray) Munz (EPWI2) (syn = *Maurandya wislizeni*) Vine Balloonbush

A fast-growing vine that climbs over other shrubs.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x	x	x				
Fruit								x	x	x	x	
Leaves								x	x	x	x	

Botanical Description: Annual vine, twining and climbing over other plants. Leaves alternate, triangular, 3–10 cm long, splotched with white. Tubular flowers blue- to violet-white. Fruits form at the center of star-like bracts.

Phenology: Flowers April to August.

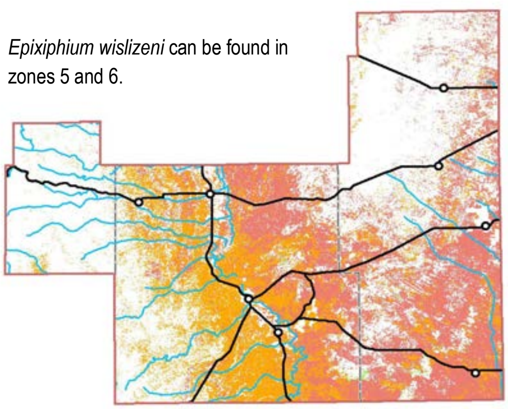
Habitat: Sandhill Shrubland and Chihuahuan Semi-Desert Grassland.

Food: Pods were eaten fresh or boiled (Castetter and Opler 1936).

Medicine: Various native peoples have used this plant for snake bites and to reduce swellings (Swank 1932). Crushed leaves of this plant have been rubbed on pimples as a medicinal remedy (Warnock 1974).

Storage: Dried leaves could be stored for several years.

Archaeology: No archaeological Scrophulariaceae plant remains have been identified in the CFO region.



Epixiphium wislizeni can be found in zones 5 and 6.

Seed. Longer marks =1 mm

Vine Balloonbush

Vine Balloonbush –flower

Vine Balloonbush –developing fruit

Vine Balloonbush –dry fruit

Penstemon ambiguous Torr. (PEAM)
Bush Penstemon, Beardtongue

A bush penstemon growing on sand dunes.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x	x	x	x	x		
Leaves					x	x	x	x	x	x		

Botanical Description: Perennial shrub with erect stems, either smooth or hairy. Leaves opposite. Flower pink externally, 15–24 mm long, white on the face.

Phenology: Flowers May–October.

Habitat: Sandhill Shrubland.

Similar Species: ***Penstemon buckleyi*** is an perennial herb, flowers pale lavender-blue, compactly clustered, petals lobes less than 7 mm long, flowers 14–20 mm long. Growing less than 50 cm tall in sandy grasslands. ***Penstemon fendleri*** is a perennial herb with violet flowers, openly clustered, growing in the foothills. ***Nuttallanthus texanus*** is an annual forb with alternate leaves along the stem, bluish to purplish flowers, flowering early in spring.

Medicine: Has been used as an emetic and as a poultice (Moerman 1998).

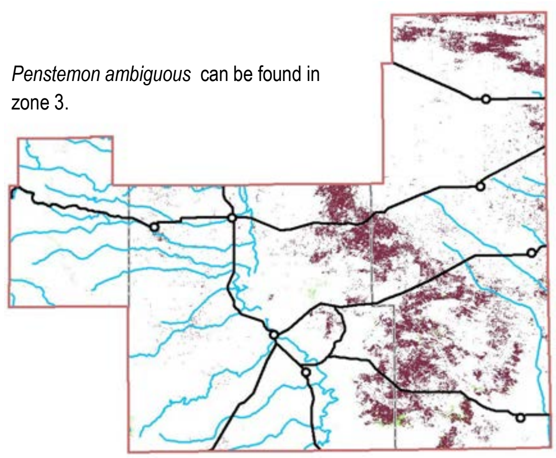
Storage: Dried leaves could be stored for several years.

Archaeology: No archaeological Scrophulariaceae plant remains have been identified in the CFO region.

Bush Penstemon

The Snapdragon Family is sometimes combined with the Plantaginaceae. It has irregular flowers with three lobes down and two lobes up.

Bush Penstemon –flower



Bush Penstemon –fruit

Bush Penstemon –seeds

Chamaesaracha sordida (Dunal) A. Gray (CHSO)
Five Eyes

A low-growing, fuzzy-leaved perennial.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x	x	x				
Seed						x	x	x	x	x	x	

Botanical Description: Perennial forb, low and spreading from roots, up to 30 cm tall, densely hairy. Leaves alternate, narrowly lance-shaped, wavy, 1–10 cm long. Flowers five united white-yellowish green petals, 3–5 mm long by 1–2 cm wide, densely glandular-hairy on the back, on short stalks 1–3 cm long. Fruit is a spherical berry, 4–8 mm wide, white, hanging. Seeds light brown, pitted like a honeycomb.

Phenology: Flowers April through the summer.

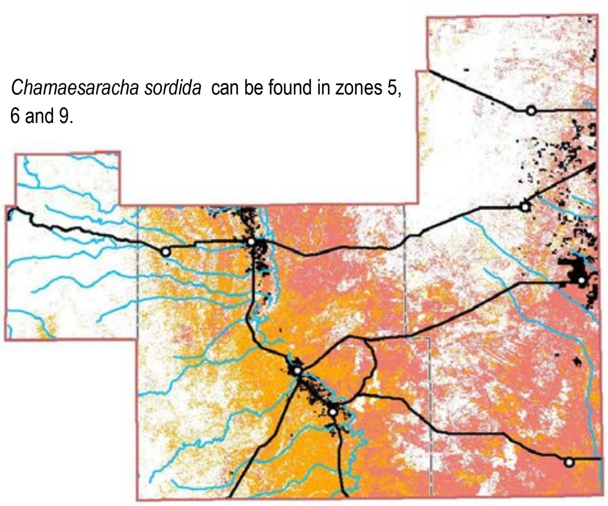
Habitat: Weedy areas, Chihuahuan Desert Scrub, Mesquite Scrub.

Similar Species: This plant is similar to *Physalis*, but the husk fits tightly around fruit, instead of forming a papery lantern around the fruit. ***Chamaesaracha coronopus*** has branched or star-shaped hairs (use a hand lens) whereas ***Chamaesaracha coniodes***, like *C. sordida*, has glandular hairs. *C. coniodes* young leaves are deeply toothed, whereas *C. sordida* has leaves shallowly few-toothed or entire.

Food: Native people saved the seeds from the fruit, drying and grinding them to make meal (Warnock 1974). Tull (2013) reports that the fruit is not edible. There have been no reports of use in the CFO region in historic ethnographic accounts.

Storage: Dried seeds could be stored for several years.

Archaeology: There have been 11 finds of *Chamaesaracha* in the CFO region, starting in the Late Archaic through the Post Formative. These finds may be from intentional collection and use, but could also be from unintentional burning.



Chamaesaracha sordida can be found in zones 5, 6 and 9.

Five Eyes

Five Eyes –flowers

The Tomato Family is characterized by alternate leaves without stipules (growths at base of leaves), and flowers radially symmetrical with five petals united into a tube.

Five Eyes –fruit

Jimson Weed

Jimson Weed –fruit

Jimson Weed –dried fruit

Jimson Weed –seeds

Datura quercifolia Kunth (DAQU)
Jimson Weed, Locoweed, Chinese Thorn-Apple

A robust annual with large green sprawling leaves, trumpet-shaped white flowers, and spiked seedpods.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x				
Root	x	x	x	x	x	x	x	x	x	x	x	x

Botanical Description: Annual forb with a short tap root. Leaves oval, 6–16 cm long, 3–6 cm wide, the upper surface smooth, the lower surface hairy, especially along veins. Flowers funnel-shaped, 4–7 cm long, white with light violet. Fruits erect, green, with numerous unequal-length spines, the longer ones more than 1 cm long. Fruit breaks into four pieces to scatter rough seeds 3–4.5 mm long, 2.5–3.5 mm wide.

Phenology: Flowers open at night in summer following monsoon rains.

Habitat: Not-native. Roadsides and disturbed areas, also Sandhill Shrubland.

Similar Species: ***Datura wrightii*** has much larger flowers 14–26 cm long and nodding (not erect) fruits.

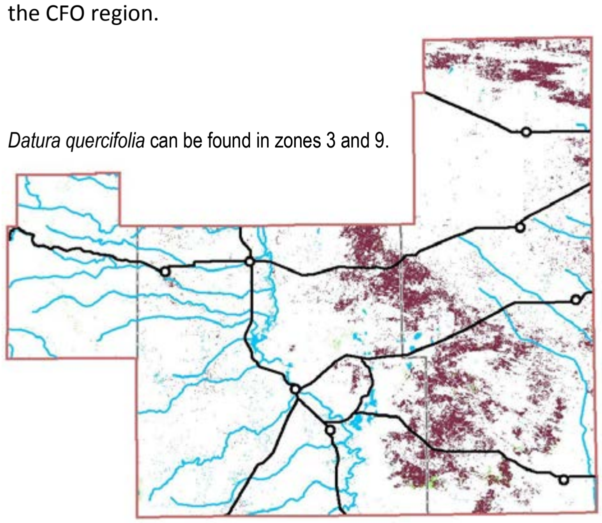
Medicine/Ceremonial: Virtually all Southwestern groups used *Datura* for some combination of divination, prophecy, initiation ceremonies, ritual intoxication, or healing. *Datura* is not listed as being used by Mescalero Apache.

Toxic: All parts of this plant are toxic. Datura is the most common wild plant reported to poison control. Several people die every year trying to eat enough to hallucinate. *Datura* has been used in some tribes' initiation rites. It is one of the most potent hallucinogenic plants in North America, and reactions to ingestion of any part of the plant can include frightening visions, memory loss, very high fever, tachycardia (heartbeat above 120/minute), and occasionally, death (Tull 2013).

Storage: Dried seeds and leaves could be stored for several years.

Archaeology: *Datura* has not been found archaeologically in the CFO region.

Datura quercifolia can be found in zones 3 and 9.



Lycium pallidum Miers (LYPA)

Pale desert-thorn, Wolfberry

A spiny shrub with bright green, almost succulent leaves and dark gray, brown, or black stems.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x						
Fruit							x	x				

Botanical Description: Spiny drought-deciduous shrub 1-2 m tall, few thorny branches, tan to silvery-gray, the older stems often dark reddish brown or black. Leaves are smooth, oblong, 1–5 cm long, 3–15 mm wide, rounded. Flowers solitary or few in groups from the leaf bases; individual flowers bell-shaped, 12–25 mm long, 5-lobed, white or pale lavender and greenish with purple veins. Fruits are red juicy berries, about 1 cm in diameter, with 4–50 seeds.

Phenology: Flowers in spring and produces berries in mid-summer.

Habitat: Chihuahuan Desert Scrub.

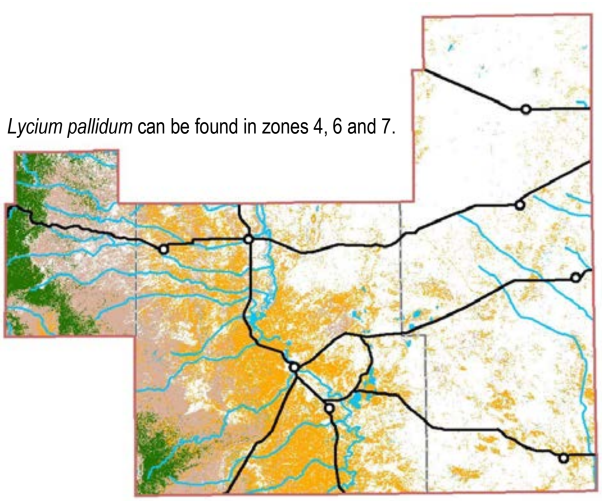
Medicine: The Navajo considered this a sacred plant and used it as medicine for toothache, chicken pox, and as a ceremonial emetic. (Vestal 1952).

Food: Edible berries can be eaten raw, dried, or boiled. Interestingly, the berries are reported to temporarily blacken teeth (Tull 2013). Goji berries are a popular health food derived from *Lycium barbarum,* a Eurasian species.

Storage: Dried fruit could be stored for several years.

Archaeology: This taxon has not been found in the CFO region.

Lycium pallidum can be found in zones 4, 6 and 7.



Wolfberry

The roots are relatively extensive compared to the stems: roots can extend 7.5–9.0 meters from the plant!

Wolfberry –flowers

Wolfberry –fruit

Wolfberry –stem with thorns

Desert Tobacco

The Tomato Family includes important food crops such as the potato (*Solanum tuberosum*), tomato (*Solanum lycopersicum*), and eggplant (*Solanum melongena*). Chili peppers and bell peppers are derived from *Capsicum* spp. and commercial tobacco is made from *Nicotiana tabacum*.

Desert Tobacco –flower

Desert Tobacco –seeds

Nicotiana obtusifolia
M. Martens & Galeotti (NIOB)
Desert Tobacco

An erect herb with sticky leaves and flowers.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x						
Leaves			x	x	x	x	x	x	x	x	x	

Botanical Description: Previously called ***Nicotiana trigonophylla*.** Perennial forb to 80 cm covered with sticky glandular hairs. Stem may have a woody base. Leaves alternate, clasping (wrapped around stem), 3–10 cm long. Flowers tubular, white or green-tinged, 2.6 cm long, hairy on the back. Fruit is a capsule with numerous tiny black seeds.

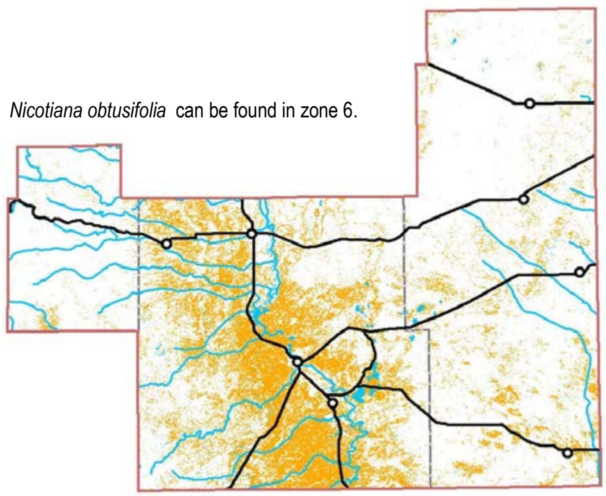
Phenology: Flowers March–June.

Habitat: Chihuahuan Desert Scrub.

Medicine/Ceremonial: Smoked as tobacco. Wild tobacco is much more potent and much less palatable compared to the domesticated varieties. It has also been used as an emetic and as an analgesic poultice for wounds. People have died from eating the toxic leaves (Tull 2013). *Nicotiana* has not been listed as used by Mescalero Apache.

Storage: Dried leaves could be stored for several years.

Archaeology: *Nicotiana* has not been found archaeologically in the CFO region.



Nicotiana obtusifolia can be found in zone 6.

Desert Tobacco –fruit

Physalis hederifolia A. Gray (PHHE4)
Ivyleaf Groundcherry

A much-branched perennial with yellow-green nodding flowers that form tomatillos.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x						
Fruit							x	x				
Leaves			x	x	x	x	x	x	x	x	x	

Botanical Description: Perennial branched forb 10–30 cm tall, usually glandular-hairy. Leaves alternate on short stalks, oval, 2–4 cm long with deeply toothed edges. Flowers bell-shaped, nodding, yellowish-green, with dark spots in center. Berries enclosed by a green papery husk with 10 ribs.

Phenology: Flowers late spring and produces fruit mid summer.

Habitat: Mesquite Scrub, Chihuahuan Semi-Desert Grasslands.

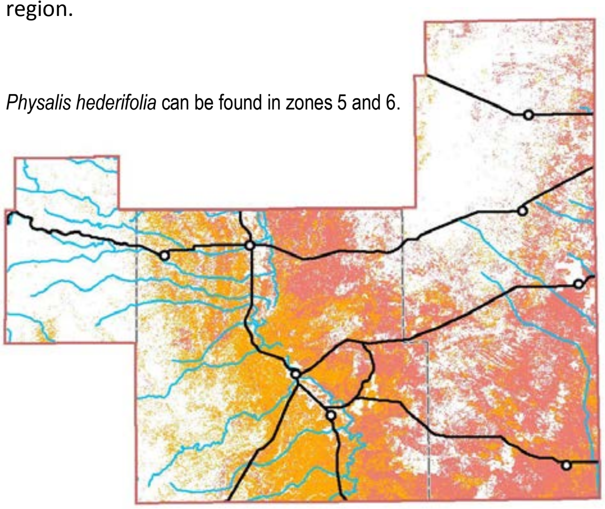
Similar Species: ***Physalis cinerascens*** is very similar, but the green fruit husk is not 10-ribbed.

Food: Some sources list wild tomatillos as edible, whereas other sources report toxicity from these species. The unripe fruit is toxic. Fruits are sweet and juicy (like a tomato) when ripe. The fruits were widely used by desert peoples (Tull 2013).

Storage: Dried fruit could be stored for at least a season.

Archaeology: This taxon has not been found in the CFO region.

Physalis hederifolia can be found in zones 5 and 6.



Ivyleaf Groundcherry –fruit

Ivyleaf Groundcherry

Ivyleaf Groundcherry –flower

Ivyleaf Groundcherry –fruit


Chinese Lantern

Quincula lobata (Torr.) Raf. (QULO2)
Chinese Lantern, Purple Groundcherry

A low-growing perennial with purple flowers that also form tomatillos.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x	x	x	
Fruit						x	x	x	x	x	x	
Root						x	x	x	x	x	x	x

Botanical Description: Previously included in ***Physalis*****.** Perennial low-growing forb with ridged stems. Forms spreading colonies from roots. Leaves alternate, lance-shaped, up to 7 cm long, smooth or lobed on the edges. Flowers from leaf bases, up to 2 cm wide, widely bell-shaped or flat-faced with five united petals. Berries enclosed by a green papery husk up to 2 cm long.

Phenology: Flowers March–November.

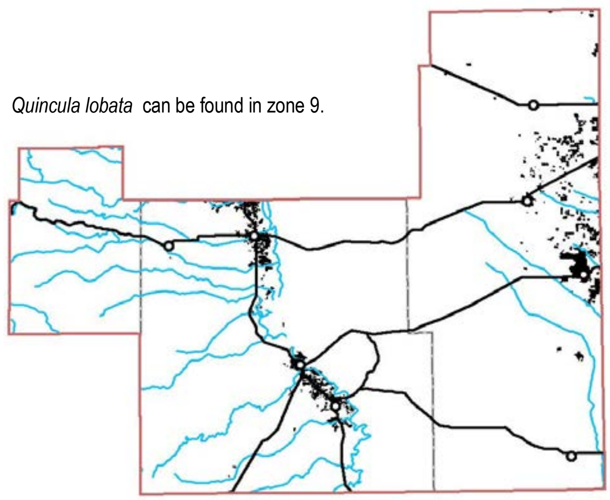
Habitat: Disturbed areas, roadsides. Mesquite Scrub.

Similar Species: ***Physalis*** species are very similar, but the flowers are yellow, not purple.

Food: The Kiowa used the berries to make jelly and a poultice from the root. (Vestal and Schultes, 1939).

Storage: Dried leaves could be stored for several years.

Archaeology: This taxon has not been found in the CFO region archaeologically.


Quincula lobata can be found in zone 9.


Chinese Lantern

Chinese Lanterns are not from China. They are a native weedy wildflower. According to some sources, the berries are edible, in contrast to the similar, but toxic, *Physalis* berries. The plants are overall very similar to *Physalis*, but with purple rather than yellow flowers.


Chinese Lantern –leaves


Chinese Lantern –flower

Solanum elaeagnifolium Cav. (SOEL)
Silverleaf Nightshade, White Horse Nettle

A plant with silvery gray-hairy leaves and lavender flowers.

Toxic

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x	x	x	x	
Fruit	x				x	x	x	x	x	x	x	x
Leaves			x	x	x	x	x	x	x	x	x	

Botanical Description: Perennial forb spreading by roots, 30–90 cm tall, sparsely to copiously prickly. Leaves alternate, simple, oblong, to 10 cm long and 2.5 cm wide, on a stalk up to 5 cm long. Flowers in groups of five to eight, on short stalks to 2 cm long; individual flowers 1 cm long, lavender, to 3.5 cm in diameter, with prominent yellow stamen. Fruits to 1.5 cm in diameter, green when immature, yellow when mature, resembling small hanging tomatoes. Seeds lens-shaped, pale to dark brown, shiny and minutely pitted.

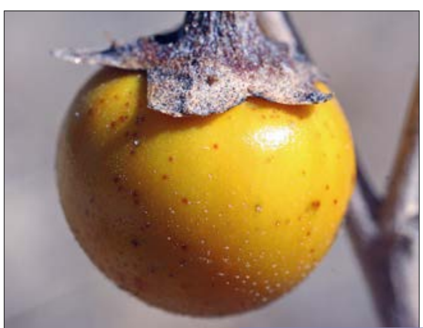
Phenology: Flowers March–November.

Habitat: Disturbed areas, roadsides, Mesquite Scrub, widespread.

Similar Species: ***Solanum rostratum*** is similar but the leaves are deeply divided and the flowers are yellow.

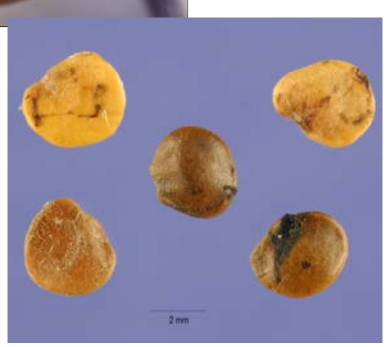
Medicine: The plant is rich in solanine, a poison that causes vomiting, dizziness, headaches, and heart palpitations (Boyd et al. 1984). Unripe green and ripe yellow -to-black fruit can cause severe poisoning. All parts of this plant are toxic (Tull 2013). Nonetheless, the roots and fruits were used by some Native peoples to treat toothaches and a variety of other ailments (Reagan 1928).

Other Uses—The Kiowa used this plant, mixed with brains, to tan hides (Vestal and Schultes 1939). **Storage:** Dried roots and fruit could be stored for several years.



Silverleaf Nightshade –fruit

Archaeology: Seeds from a *Solanum* species have been found twice in the CFO region, one Early Formative and one Late Formative. The rarity of this plant in the archaeological record makes it unlikely to have been an important food source.



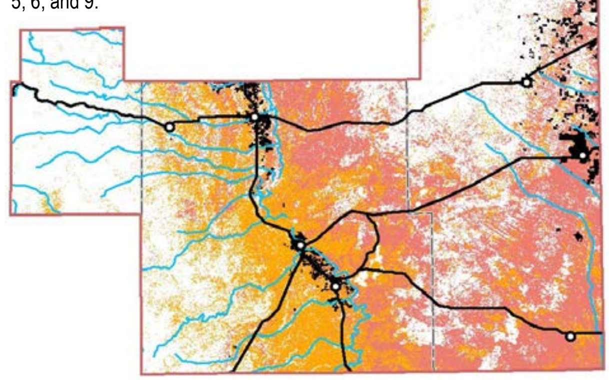
Silverleaf Nightshade –seed

Silverleaf Nightshade

Silverleaf Nightshade –flower

Did you know?
Some people have used the mashed fruit as rennet to make milk into cheese. In Mexico, a cheese made in this way is called "acedera" (Warnock 1974).

Solanum elaeagnifolium can be found in zones 5, 6, and 9.



Tamarisk

Tamarisk –branch with flower spikes

Invasive. Tamarisk was introduced from Central Asia in the 1800s for erosion control and as an ornamental landscaping plant. It now grows almost everywhere in the West with sufficient groundwater.

Tamarisk –close-up of flowers

Tamarix chinensis Lour., (TACH2)
Tamarisk, Saltcedar, Five-Stamen Tamarisk

A tree with dark ,shredding bark and droopy, scaled leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower			x	x	x	x	x	x				

Botanical Description: Deciduous small to medium tree up to 4.5 m tall with juniper-like leaves and showy pink-white flower spikes in the spring and summer. Reddish, brown, or black rough bark. Thin branched twigs are covered in small lance-shaped, scale-like leaves no more than 3 mm long. Flowers occur in dense spikes a few cm long. Flowers have five petals, fragrant. Seeds are tiny with tufted hairs, easily dispersing with wind.

Phenology: Flowers in the early spring after leaves appear.

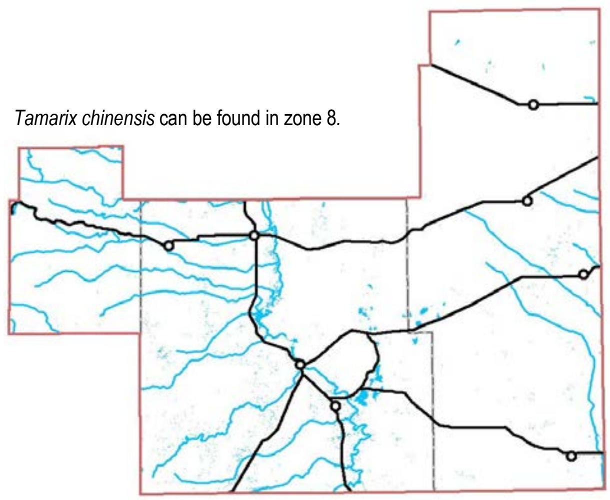
Habitat: Moist areas, especially with saline soils. Riparian Woodlands and Shrublands.

No recorded Native uses.

Storage: Limited storage capacity.

Archaeology: This recently introduced, non-native taxon has not been found in the CFO region.

Tamarix chinensis can be found in zone 8.



Tamarisk –close-up of seeds dispersing

Typha latifolia L. (TYLA)
Broadleaf Cattail
Teet (Mescalero Apache)

A robust aquatic grass-like plant with brown “cattail” spikes persisting through winter.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x							
Leaves	x	x	x	x	x	x	x	x	x	x	x	x
Pollen					x							
Root			x	x								
Seed							x	x	x	x	x	x

Botanical Description: Tall perennial grass-like aquatic. Leaves light green, 6–23 mm wide, flat, leaf sheath cylindrical and open to the base. Flowering shoots are 1–3 m tall, as long as or slightly longer than the leaves, flowers in spikes at the tips of the shoots, pollen-bearing spike 6–12 cm long, light brown, occurs above the seed-developing flower spike, which is dark brown, 10–18 cm long, 1.5–3 cm thick. Fruits are tiny (1 mm) nutlet on a stalk with many long hairs that catch the wind. The seeds are buoyant.

Phenology: Flowers in late spring, producing seed in summer–fall. Seedheads generally persist through winter, loosing millions of air- or water-borne seeds in the spring.

Similar Species: The leaves on this species are wider than the non-native *Typha angustifolia*. Also, in the non-native species the male and female flowers are separated by 1–12 cm of bare stalk.

Habitat: Shallow, slow-moving water of streams and lakes.

Ceremonial: Pollen was sprinkled onto the largest mescal crown and used in many different ceremonies. For example, cattail pollen was dusted on the ground of ceremonial tepees during the puberty ritual (Moerman 1998).

Food: Almost all parts of the plant are edible and, where available, were an important foodstuff for Native peoples. Mescalero people used the rhizome (roots) for food and cooked it with meat. In the early spring the stems were eaten raw or cooked with other food. There is a pithy little tidbit where the new green stem sprouts out of the rootstock, which can be boiled like a young potato (Angier 2008). The rhizome and lower portion of the stem are sweet and are rich in carbohydrates. They are delicious raw, baked, roasted in embers of a campfire, or can be boiled for a brief period. To enjoy, scrub the cattail and then peel them while still wet. The cores can also be dried and ground into flour. Sift before using to remove any fiber (Angier 1994). The tender young shoots resemble cucumbers in taste and are very edible. If they seem tough, you can drop them in water and simmer until tender. You can even make pickles with them! Cattails peeled of their outer rind are called “Cossack asparagus.” They contain tender white shoots in the first 30–50 cm of the stems, which can be eaten raw or cooked (Moerman 1998).

Medicine: The pollen was gathered and used as medicine. Uses are unspecified for the Mescalero, but other tribes


Broadleaf Cattail


Broadleaf Cattail –shoot


Broadleaf Cattail –flower

Typha latifolia L. (TYLA)
Broadleaf Cattail
Teet (Mescalero Apache)

....continued.

used broadleaf cattail pollen to strengthen the kidneys. The root was used as a urinary aid, to help dissolve kidney stones or stop diarrhea. It was also used to stop bleeding and as a burn dressing, as a wrap for sprains, and to treat yellow fever. Down from cattail seeds was used to stop chafing in children, and to stop bleeding navels on newborns (Gilmore 1919), as well as for whooping cough. A poultice was made from fruit spikes mixed with cattail down and coyote fat, and applied to smallpox pustules (Blankenship 1905).

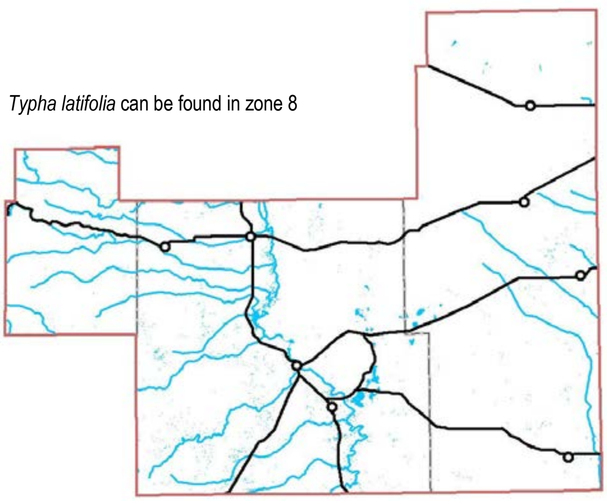
Other: Mescaleros used the leaves for floor coverings (Basehart 1960).

Storage: Pollen and rhizomes could be stored for several months, leaves and reeds if stored properly can be stored indefinitely.

Archaeology: *Typha* has not been found in the CFO region archaeologically.

Historical photographs of Apache people collecting cattail pollen from near McNary, Arizona, 1941.Photographs by Tad Nichols.

Typha latifolia can be found in zone 8



A deflated site in the Carlsbad region, this is a common outcome of erosion in the 20th century.

Netleaf Hackberry

Netleaf Hackberry –leaves & fruit

Netleaf Hackberry – flowers

Celtis laevigata var. reticulata Torr., (CELAR)
Netleaf Hackberry

A small tree with prominent veins on the leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x							
Fruit					x	x						
Wood	x	x	x	x	x	x	x	x	x	x	x	x
Seed							x	x	x	x	x	x

Botanical Description: Large shrubs or small trees usually less than 7 m tall. Bark gray and smooth or with warts or knobs. Leaves deciduous, highly variable, asymmetrical, 2–9.5 cm long by 2–5 cm wide, prominent veins, gray-green above, yellow-green below, leathery and often with insect galls. Flowers in groups at base of leaves, greenish inside red-brown buds. Fruit are orange to red spheres 6–8 mm in diameter on short stalks.

Phenology: The inconspicuous flowers appear in early spring; berries ripen May–June.

Habitat: Occasional in sand dunes and in warm desert washes and dry streambeds in the foothills. Sometimes found around old stock tanks.

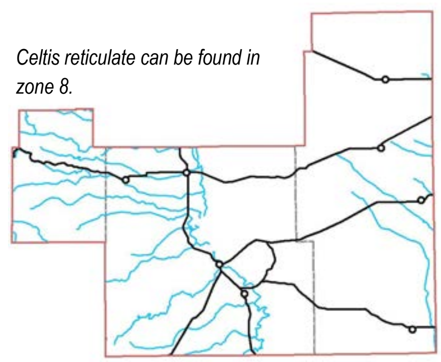
Food: A thin layer of sweet dry pulp surrounds a large pit. Fruit was ground, caked, and dried to make a meal for winter use. Jelly was also made from boiled fruit. The sweet fresh fruit was eaten raw (Tull 2013).

Medicine: Although no documentation was found for SE NM Native peoples, this plant was used by other groups to help indigestion (Wyman and Harris 1951), and sore throat and venereal disease (Speck 1941).

Storage: Dried fruit could be stored for several month.

Archaeology: *Celtis* has been found in eight sites in the CFO region, two sites with seeds and six with wood. This taxon is of minor importance in the archaeological record.

Celtis reticulate can be found in zone 8.



Netleaf Hackberry –leaves

Ulmus pumila L., (ULPU)
Siberian Elm

A medium to tall tree with small, alternate, toothed leaves and dime-sized papery seeds.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower		x	x	x	x							
Seed				x	x							
Leaves				x	x	x	x	x				

Botanical Description: Deciduous tree 15–30 m tall. Leaves 2.0–6.5 cm long by 2.0–3.5 cm wide, edges serrate, mostly hairless. Flowers clustered in small groups on the stems. Fruit are circular, flat, paper-winged seeds, 10–14 mm in diameter, with notched tips. The seeds are dispersed by wind and accumulate in large quantities where they fall.

Phenology: Flowers late winter–early spring, before leaves; seeds ripen in early spring as leaves appear.

Habitat: Commonly escaping from cultivation and growing along roadsides.

Uses: Elm leaves are edible. They reportedly make great dehydrated "kale chips" (Blair 2014).

Storage: Dried leaves could be stored for several months.

Archaeology: This taxon has not been found in the CFO region archaeologically.

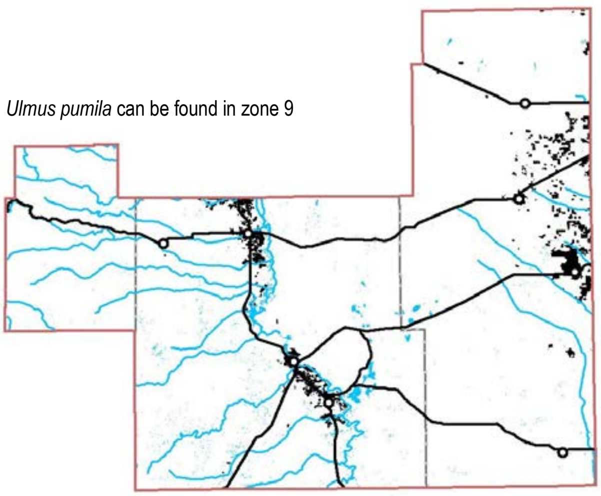

Siberian Elm


Siberian Elm –leaves


Siberian Elm –green fruit


Siberian Elm –close-up of flower

Ulmus pumila can be found in zone 9

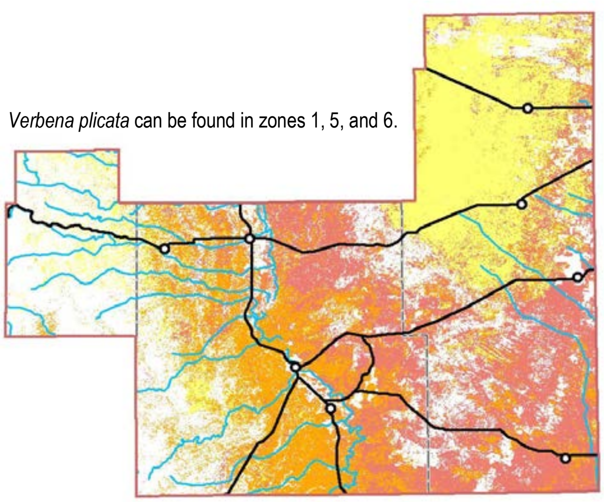


Siberian Elm –branch


Fanleaf Vervain


Fanleaf Vervain –stem


Fanleaf Vervain –stem


Verbena plicata can be found in zones 1, 5, and 6.

Verbena plicata Greene (VEPL)
Fanleaf Vervain

An erect plant with very small purple flowers in spikes.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower		x	x	x	x	x	x	x	x			

Botanical Description: A perennial forb with flowering spikes at the ends of flowering stems, up to 50 cm tall. Flowers purple, mint-like, 4–6 mm long. Leaves toothed to lobed, deeply incised, folded, and corrugated, decreasing in size upwards.

Phenology: Flowering February–September.

Habitat: Widespread but rarely frequent. Great Plains Shortgrass Prairie and Mesquite Scrub, especially on loamy soils.

Similar Species: Purple prairie verbena (***Glandularia bipinnatifida***) is an annual forb in the same family with deeply lobed leaves and pink-purple flowers. It is one of the first flowers of spring and can carpet the desert after wet winters. A small penstemon, Texas toadflax (***Nuttallanthus texanus***) has larger purple flowers with simple opposite leaves. The stems are weaker and not at all square.

It is a common early spring wildflower, especially in Sandy Plains Semi-Desert Grassland.

Medicine: Moore (2003) references *V. plicata* along with other verbenas and vervains as interchangeable. "*Broadly active medicinally, serving as a sedative, diaphoretic, diuretic, bitter tonic, and antispasmodic. It is one of the best palliatives for the onset of a virus cold, particularly with upper respiratory inflammation. It will promote sweating, relax and soothe, allay feverishness, settle the stomach, and generally produce a feeling of relaxed well-being…The tea is an effective sedative for insomnia and, like Hops, will settle a nervous stomach." It should be noted that use in greater dosages than recommended can lead to nausea and vomiting."* (Moore 2003, pg. 255).

Storage: Dried leaves could be stored for several years.

Archaeology: *Verbena* and *Verbesina* seeds have been found in 11 sites in the CFO region, as single seed finds in Late Archaic and Early Formative sites. This family of plants is most likely unintentionally included in the archaeological record.

Vitis arizonica Engelm. (VIAR2)
Canyon Grape

A thick woody vine growing on trees in canyons.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower					x	x						
Fruit								x	x			

Botanical Description: A woody vine with shreddy bark and large toothed leaves, 3–5 cm across. Leaves are soft and hairy when young, becoming smooth as they mature. Flowers are numerous, tiny, in clusters.

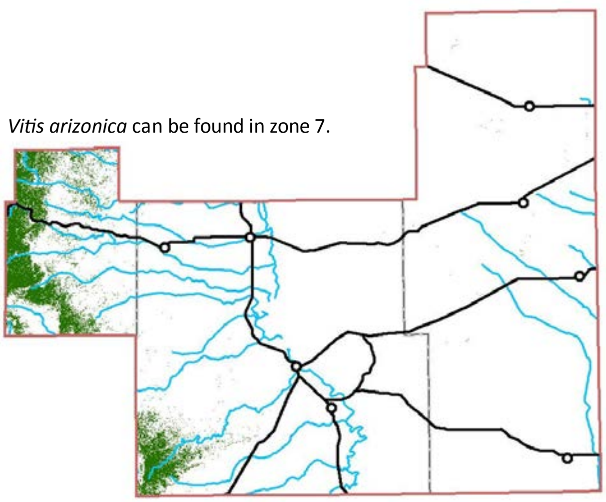
Phenology: Blooms May–June, fruit forms August–September.

Habitat: Pinyon-juniper canyons, riparian woodland.

Food: The fruit was eaten fresh or dried (Castetter and Opler, 1936; Basehart, 1974). The juice from the berries could be boiled to make a kind of wine (Buskirk, 1986).

Storage: Dried fruit could be stored for several years.

Archaeology: This taxon has not been found in the CFO. region.



Vitis arizonica can be found in zone 7.

Canyon Grape

Canyon Grape—developing fruit

Canyon Grape—fruits

Canyon Grape—flower

Kallstroemia parviflora J.B.S. Norton (KAPA)
Caltrop

A hairy low-growing annual
with compound leaves.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x			

Botanical Description: Annual forb with horizontal stems, up to 30 cm tall, grayish-hairy. Leaves opposite, compound, 3–6 cm long. Leaflets usually in pairs of four, about 1 cm long, oblong, hairy. Flowers on 1–3 cm long stalks, yellow-orange, 6–12 mm diameter. Fruit is dry, splitting into 10 one-seeded sections, 4 mm wide, wrinkled.

Phenology: Flowering June to September.

Habitat: Weedy areas, Mesquite Upland Scrub, and Chihuahuan Desert Thornscrub.

Medicine: Moore (2003) references the same uses for several *Kallstromia* spp including *K. californica*, *K. grandiflora*, K. *hirsutissima*, and *K. parviflora*. "*An effective astringent and hemostatic, with its effects lasting the length of the intestinal tract and therefore useful in dysentery and general intetinal inflammations..when drunk after a sprain or major bruise or hemotoma, it will help stabilize the injury and facilitate quicker healing. The tea will also lessen menstrual flow. A few leaves in a little water make a soothing eyewash*." (Moore 2003, pg. 94)

Storage: Limited storage capacity.

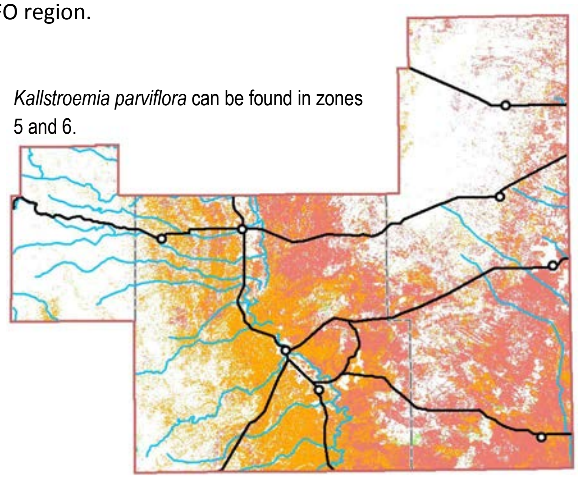
Archaeology: No archaeological finds of this species in the CFO region.

Caltrop

Caltrop –leaves

Caltrop –flower

Caltrop –fruit



Caltrop– fruit

Larrea tridentata (DC.) Coville (LATR2)
Creosote Bush, Chaparral

Dark green leaves on spindly branches

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower				x	x	x						
Leaves			x	x	x	x	x	x	x	x	x	

Botanical Description: Shrub to 2 m. The foliage smells like creosote. Leaves opposite, two-lobed. Flowers yellow, fruit covered in white hairs.

Phenology: Leaves and flowers appear in response to rain throughout the year.

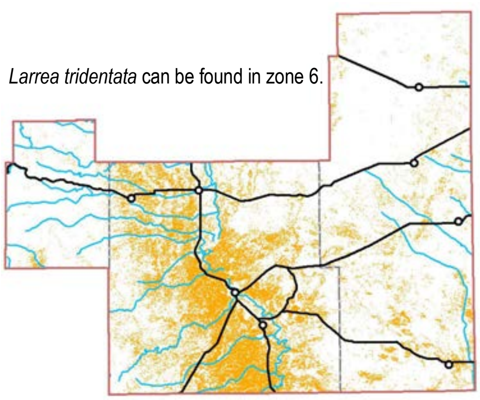
Habitat: Chihuahuan Desert Scrub.

Similar Species: Tarbush, *Flourensia cernua,* has a similar smell, but has wider leaves, is bushier overall, and is in the Asteraceae family. These two shrubs often grow in the same areas.

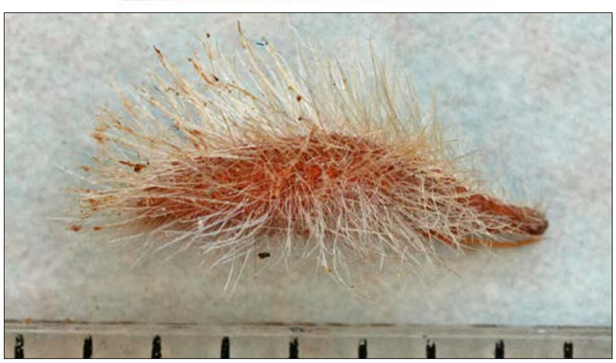
Medicine: Although not specifically mentioned in SE NM ethnobotanical literature, a tea of the leaves was used by other Native peoples to treat respiratory problems, sexually transmitted diseases, tuberculosis, chickenpox, dysmenorrhea, and snakebite. The U.S. Food and Drug Administration has issued warnings about the health hazards of ingesting chaparral today because of the risk of liver and kidney damage.

Storage: Dried leaves could be stored for several years.

Archaeology: *Larrea* wood is considered an important supplemental fuel in the CFO region. There have been 21 sites with carbonized *Larrea* wood. *Larrea* is present from the Early Archaic through the Post Formative, with the majority of sites in the Early and Late Formative.



Larrea tridentata can be found in zone 6.



Creosote Bush –fruit

Creosote Bush

Creosote Bush –leaves

Creosote Bush –flowers

Creosote Bush –fruit

Puncture Vine

Puncture Vine –leaves

Puncture Vine –flower

Puncture Vine –fruit

Tribulus terrestris L. (TRTE)
Puncture Vine, Goat's Head

A prostrate, compound-leafed annual with horrible spiny seeds; common in sandy waste areas.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Flower						x	x	x	x			
Leaves			x	x	x	x	x	x	x	x		

Botanical Description: Annual forb with horizontal stems, hairy, diffusely branched, forming mats up to 1 m wide. Leaves opposite, compound, 2–6 cm long, 1–3 cm wide. Flowers solitary from leaf base, yellow, 5–10 mm across. Fruit is a spiny bur, 1-cm diameter, splitting into 5 segments, each with 3–5 seeds.

Phenology: Flowering June to September.

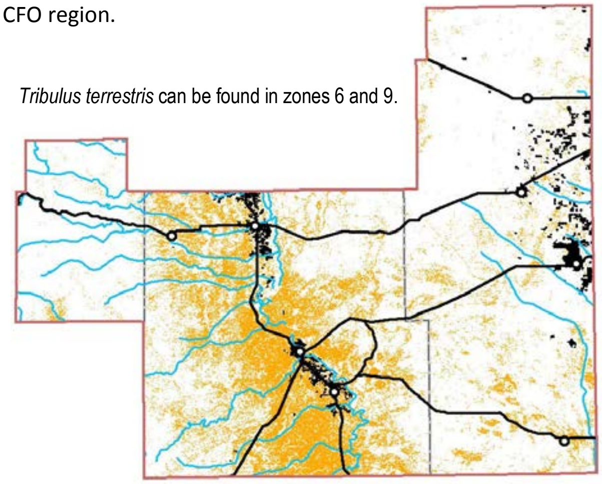
Habitat: Disturbed areas and Chihuahuan Desert Thornscrub.

Medicine: This herb has been used in traditional medicine for centuries. Having an active compound called steroidal saponins, it is used for infertility, impotence, a gargle for mouth problems, kidney stones, libido, muscle mass, skin conditions, and urinary problems (Kane 2011). Moore (1995) provides detailed description of collecting and preparing this plant for medicinal use.

Storage: Dried leaves could be stored for several years.

Archaeology: Not found in archaeological record in the CFO region.

Tribulus terrestris can be found in zones 6 and 9.



Puncture Vine –seeds

Appendixes

Appendix A
Plants by Ecoregion

Genus	Species	Common Name (USDA, If Available)	Chihuahuan Semi-Desert Grassland	Developed / Disturbed	Great Plains Shortgrass Prairie	Mesquite Upland Scrub	Chihuahuan Desert Thornscrub	Pinyon-Juniper Woodland	Sandhill Shrubland	Sandy Plains Semi-Desert Grassland	Wetlands and Swales
Agavaceae											
Agave	*parryi*	Parry's Agave	x								
Yucca	*baccata*	Banana Yucca	x					x			
Yucca	*campestris*	Plains Yucca				x				x	
Yucca	*elata*	Soaptree Yucca	x								
Yucca	*torreyi*	Torrey's Yucca	x				x				
Amaranthaceae											
Amaranthus	*albus*	Prostrate Pigweed	x	x							x
Amaranthus	*retroflexus*	Redroot Amaranth	x	x							x
Anacardiaceae											
Rhus	*microphylla*	Littleleaf Sumac									x
Rhus	*trilobata*	Skunkbush Sumac						x			
Asclepiadaceae											
Asclepias	*asperula*	Spider Milkweed				x	x				
Funastrum	*cynanchoides*	Fringed Twinevine				x	x				x
Asteraceae											
Acourtia	*nana*	Desert Holly	x			x	x				
Artemisia	*carruthii*	Carruth's Sagewort	x					x			
Artemisia	*filifolia*	Sand Sagebrush							x	x	
Artemisia	*ludoviciana*	Louisiana Sagewort						x			
Cirsium	*neomexicanum*	New Mexico Thistle	x				x	x			
Cirsium	*ochrocentrum*	Yellowspine Thistle	x				x	x			
Dyssodia	*papposa*	Fetid Marigold		x		x	x	x		x	x
Flourensia	*cernua*	American Tarwort					x				
Gutierrezia	*sarothrae*	Broom Snakeweed	x	x	x	x	x	x		x	x
Helenium	*microcephalum*	Littlehead Tarweed									x
Helianthus	*annuus*	Common Sunflower		x							x
Helianthus	*ciliaris*	Texas Blueweed		x							
Helianthus	*neglectus*	Neglected Sunflower							x	x	
Helianthus	*petiolaris*	Prairie Sunflower			x				x	x	
Laennecia	*coulteri*	Coulter's Horseweed	x	x	x	x	x				
Liatris	*punctata*	Dotted Gayfeather			x						
Melampodium	*leucanthum*	Plains Blackfoot		x	x	x	x				
Parthenium	*confertum*	Gray's Feverfew	x				x				x
Psilostrophe	*tagetina*	Woolly Paperflower	x	x	x	x	x	x			
Senecio	*flaccidus*	Threadleaf Ragwort	x				x			x	
Thelesperma	*megapotamicum*	Hopi Tea Greenthread		x			x				x
Thymophylla	*acerosa*	Pricklyleaf Dogweed		x		x	x				
Verbesina	*encelioides*	Crownbeard	x	x							x
Xanthium	*strumarium*	Cocklebur									x
Zinna	*grandiflora*	Rocky Mountain Zinnia	x	x	x	x	x				
Berberidaceae											
Mahonia	*haematocarpa*	Red Barberry	x				x	x			
Bignoniaceae											
Chilopsis	*linearis*	Desert Willow									x

Genus	Species	Common Name (USDA, If Available)	Chihuahuan Semi-Desert Grassland	Developed / Disturbed	Great Plains Shortgrass Prairie	Mesquite Upland Scrub	Chihuahuan Desert Thornscrub	Pinyon-Juniper Woodland	Sandhill Shrubland	Sandy Plains Semi-Desert Grassland	Wetlands and Swales
Boraginaceae											
Cryptantha	*cinerea*	Cryptantha	x			x					
Heliotropium	*convolvulaceum*	Heliotrope							x		
Tiquilia	*canescens*	Woody Crinklemat					x				
Brassicaceae											
Capsella	*bursa-pastoris*	Shepherd's Purse		x		x					x
Descurainia	*sophia*	Herb Sophia		x		x					
Dimorphocarpa	*wislizeni*	Touristplant, Spectacle Pod		x		x	x		x	x	
Lepidium	*alyssoides*	Mesa Pepperwort		x		x	x	x			
Lesquerella	*fendleri*	Fendler's Bladderpod				x	x				
Cactaceae											
Coryphantha	*macromeris,*	Nipple Beehive Cactus					x				
Cylindropuntia	*imbricata*	Tree Cholla	x		x			x			
Cylindropuntia	*leptocaulis*	Christmas Cactus	x					x			
Echinocactus	*texensis*	Horse Cripler	x			x	x				
Echinocereus	*coccineus*	Scarlet Hedgehog Cactus	x				x				
Echinocereus	*fendleri*	Pinkflower Hedgehog Cactus	x								
Echinocereus	*reichenbachii*	Lace Hedgehog Cactus				x	x				
Escobaria	*vivipara*	Spinystar	x					x			
Mammillaria	*grahamii*	Graham's Nipple Cactus	x								
Opuntia	*macrocentra*	Prickly Pear Cactus	x			x	x				
Chenopodiaceae											
Atriplex	*canescens*	Fourwing Saltbush	x	x	x			x			x
Bassia	*scoparia*	Burningbush	x	x	x	x	x	x	x	x	x
Chenopodium	*album*	Lambsquarters	x	x				x			x
Chenopodium	*berlandieri*	Pitseed Goosefoot	x	x				x			x
Krascheninnikovia	*lanata*	Winterfat			x	x					
Salsola	*tragus*	Prickly Russian Thistle	x	x	x	x	x	x			x
Commelinaceae											
Commelina	*erecta*	Whitemouth Dayflower							x	x	
Cucurbitaceae											
Citrullus	*lanatus*	Watermelon		x						x	
Cucurbita	*foetidissima*	Missouri Gourd	x	x	x	x		x			
Cupressaceae											
Juniperus	*deppeana*	Alligator Juniper						x			
Juniperus	*monosperma*	Oneseed Juniper						x			
Juniperus	*pinchotii*	Pinchot's Juniper	x					x			
Cyperaceae											
Cyperus	*esculentus*	Yellow Nutsedge							x		x
Elaeagnaceae											
Elaeagnus	*angustifolia*	Russian Olive		x							x
Ephedraceae											
Ephedra	*torreyana*	Torrey's Jointfir	x				x				
Equisetaceae											
Equisetum	*laevigatum*	*Scouring Rush*									x
Euphorbiaceae											
Acalypha	*pheoides*	Shrubby Copperleaf					x	x			
Chamaesyce	*glyptosperma*	Sandmat				x			x	x	
Croton	*pottsii*	Croton					x			x	
Euphorbia	*davidii*	Spurge	x								x

Genus	Species	Common Name (USDA, If Available)	Chihuahuan Semi-Desert Grassland	Developed / Disturbed	Great Plains Shortgrass Prairie	Mesquite Upland Scrub	Chihuahuan Desert Thornscrub	Pinyon-Juniper Woodland	Sandhill Shrubland	Sandy Plains Semi-Desert Grassland	Wetlands and Swales
Fabaceae											
Acacia	*constricta*	Whitethorn Acacia					x				
Acacia	*greggi*	Catclaw Acacia					x				
Astragalus	*mollisimus*	Milkvetch	x			x	x	x		x	
Dalea	*formosa*	Featherplume			x		x				
Dalea	*purpurea*	Purple Prairie Clover			x						
Hoffmannseggia	*glauca*	Indian Rushpea	x	x	x	x	x				
Prosopis	*glandulosa*	Honey Mesquite	x	x		x	x				x
Psoralidium	*tenuiflorium*	Slimflower Scurfpea							x	x	
Senna	*bauhinioides*	Twinleaf Senna	x			x	x				
Sophora	*secundiflora*	Mescal Bean	x								
Vicia	*ludoviciana*	Louisiana Vetch	x					x			
Fagaceae											
Quercus	*gambelli*	Gambel Oak						x			
Quercus	*havardii*	Havard Oak							x	x	
Fouquieriaceae											
Fouquieria	*splendens*	Ocotillo					x				
Hydrophyllaceae											
Phacelia	*popei*	Pope's Phacelia					x			x	
Juglandaceae											
Juglans	*major*	Arizona Walnut									x
Juncaceae											
Juncus	*articus*	Arctic Rush									x
Koeberliniaceae											
Koeberlinia	*spinosa*	Crown Of Thorns	x				x				
Krameriaceae											
Krameria	*erecta*	Littleleaf Ratany	x			x	x				
Lamiaceae											
Hedeoma	*nana*	False Pennyroyal	x					x			
Marrubium	*vulgare*	Horehound		x		x					
Mentha	*arvensis*	Canadian Mint									x
Monarda	*punctata*	Spotted Beebalm				x	x		x	x	
Poliomintha	*incana*	Hoary Rosemarymint					x				
Scutellaria	*drummondii*	Drummond's Skullcap	x								
Liliaceae											
Allium	*drummondii*	Geyer's Onion				x				x	
Dasylirion	*leiophyllum*	Green Sotol	x								
Nolina	*microcarpa*	Sacahuista	x								
Nothoscordum	*texanum*	Texas False Garlic								x	
Linaceae											
Linum	*aristatum*	Flax				x	x			x	
Loasaceae											
Cevalia	*sinuata*	Stinging Serpent	x				x				x
Mentzelia	*multiflora*	Blazingstar	x	x	x	x	x				
Malvaceae											
Sphaeralcea	*angustifolia*	Globemallow	x	x	x	x	x	x			

Genus	Species	Common Name (USDA, If Available)	Chihuahuan Semi-Desert Grassland	Developed / Disturbed	Great Plains Shortgrass Prairie	Mesquite Upland Scrub	Chihuahuan Desert Thornscrub	Pinyon-Juniper Woodland	Sandhill Shrubland	Sandy Plains Semi-Desert Grassland	Wetlands and Swales
Moraceae											
Maclura	*pomifera*	Osage Orange		x							
Morus	*microphilla*	Texas Mulberry		x							x
Nyctaginaceae											
Abronia	*fragrans*	Snowball Sand Verbena							x		
Onagraceae											
Calylophus	*serrulatus*	Sundrops							x	x	
Gaura	*villosa*	Beeblossom							x	x	
Oenothera	*albicaulis*	Whitest Eveningprimrose		x		x	x				
Papaveraceae											
Argemone	*squarrosa*	Hedgehog Pricklypoppy		x		x					
Pedaliaceae											
Proboscidea	*louisianica*	Louisiana Ram's Horn					x		x	x	
Pinaceae											
Pinus	*edulis*	Twoneedle Pinyon						x			
Pinus	*ponderosa*	Ponderosa Pine						x			
Pinus	*strombiformis*	Southwestern White Pine									
Plantaginaceae											
Plantago	*patagonica*	Plantain				x	x			x	
Poaceae											
Achnatherum	*hymenoides*	Needlegrass	x		x						
Andropogon	*gerardii*	Big Bluestem			x				x	x	
Bothriochloa	*barbinoides*	Cane Bluestem	x		x				x	x	x
Bouteloua	*eriopoda*	Black Grama	x		x			x			
Bouteloua	*gracilis*	Blue Grama	x		x			x			
Cenchrus	*spinifex*	Coastal Sandbur							x		
Chloris	*cucullata*	Hooded Windmill Grass				x	x				
Elymus	*canadensis*	Canada Rye Grass	x					x			
Eragrostis	*lehmannii*	Lehmann Lovegrass		x		x				x	
Muhlenbergia	*porteri*	Bush Muhly	x			x	x				
Muhlenbergia	*wrightii*	Spike Muhly	x					x			
Panicum	*obtusum*	Obtuse Panicgrass									x
Phragmites	*australis*	Common Reed									x
Pleuraphis	*mutica*	Tobosagrass									x
Schizachyrium	*scoparium*	Little Bluestem			x			x	x		
Setaria	*leucopila*	Streambed Bristlegrass									x
Sporobolus	*airoides*	Alkali Sacaton									x
Sporobolus	*cryptandrus*	Sand Dropseed	x				x			x	
Sporobolus	*giganteus*	Giant Dropseed							x		
Zea	*mays*	Corn		x							
Polygonaceae											
Eriogonum	*annuum*	Annual Buckwheat							x	x	
Polygonum	*lapathifolium*	Knotweed									x
Rumex	*hymenosepalus*	Canaigre Dock				x			x		
Portulacaceae											
Portulaca	*oleracea*	Little Hogweed		x		x					
Rhamnaceae											
Condalia	*ericoides*	Javelina Bush					x				
Ziziphus	*obtusifolia*	Lotebush	x				x				

Genus	Species	Common Name (USDA, If Available)	Chihuahuan Semi-Desert Grassland	Developed / Disturbed	Great Plains Shortgrass Prairie	Mesquite Upland Scrub	Chihuahuan Desert Thornscrub	Pinyon-Juniper Woodland	Sandhill Shrubland	Sandy Plains Semi-Desert Grassland	Wetlands and Swales
Rosaceae											
Fallugia	*paradoxia*	Apache Plume						x			
Prunus	*virginiana*	Chokecherry						x			x
Rosa	*woodsii*	Woods' Rose		x				x			x
Salicaceae											
Populus	*deltoides*	Rio Grande Cottonwood									x
Salix	*exigua*	Willow									x
Sapindaceae											
Sapindus	*saponaria*	Western Soapberry		x					x	x	x
Scrophulariaceae											
Epixiphium	*wislizeni*	Balloonbush				x	x			x	
Penstemon	*ambiguus*	Beardtongue							x	x	
Solanaceae											
Chamaesaracha	*sordida*	Five Eyes		x		x	x				
Datura	*quercifolia*	Chinese Thorn-Apple							x	x	x
Lycium	*pallidum*	Wolfberry	x				x	x			x
Nicotiana	*obtusifolia*	Desert Tobacco					x				x
Physalis	*hederifolia*	Groundcherry				x	x				
Quincula	*lobata*	Chinese Lantern		x							
Solanum	*elaeagnifoliu*	Nightshade		x		x	x				
Tamaricaceae											
Tamarix	*chinensis*	Tamarisk									x
Typhaceae											
Typha	*latifolia*	Broadleaf Cattail									x
Ulmaceae											
Celtis	*reticulata*	Netleaf Hackberry		x					x		x
Ulmus	*pumila*	Siberian Elm		x							x
Verbenaceae											
Verbena	*plicata*	Vervain			x	x	x				
Vitaceae											
Vitus	*arizonica*	Canyon Grape						x			x
Zygophyllaceae											
Kallstroemia	*parviflora*	Caltrop				x	x			x	
Larrea	*tridentata*	Creosote Bush					x				
Tribulus	*terrestris*	Puncturevine		x			x				

Appendix B
Plant use by Season

Table 1. Spring Plant Availability: Major Use by Plant Family, Common Name, Plant Part, Specific Use, and Ecoregion

Artifacts

Agavaceae
Banana Yucca; Root/Tuber; Soap; 4 7
Banana Yucca; Stalk; Artifacts; 4 7
Banana Yucca; Thorn; sewing; 4 7
Parry's Agave; Leaves; Soap; 4
Parry's Agave; Leaves; ties and rope; 4
Parry's Agave; Thorn; Sewing; 4
Plains Yucca; Root/Tuber; Soap; 2 5
Soaptree Yucca; Leaves; ties and rope; 4
Soaptree Yucca; Root/Tuber; Soap; 4
Anacardiaceae
Skunkbush Sumac; Bark; Baskets; 7
Skunkbush Sumac; Stem; Baskets; 7
Sumac; Wood; Artifacts; 4 7
Asclepiadaceae
Spider Milkweed; Fiber; Strings; 5 6
Bignoniaceae
Desert Willow; Wood; many; 8
Cactaceae
Nipple Beehive Cactus; Thorn; Weapon; 6
Chenopodiaceae
Fourwing Saltbush; Root/Tuber; Soap; 1 4 7 8 9
Cupressaceae
Juniper; Branches; Artifacts; 7
Juniper; Wood; Artifacts; 7
Fabaceae
Honey Mesquite; Root/Tuber; Cradle Board, baskets; 4 5 6 8 9
Slimflower Scurfpea; Stem; garlands; 2 3
Fagaceae
Gambel Oak; Wood; many; 7
Oak; Branches; Artifacts; 7
Oak; Leaves; Artifacts; 7
Oak; Wood; Artifacts; 7
Fouqueriaceae
Ocotillo; Branches; Shelter; 6
Ocotillo; stem; Many; 6
Ocotillo; Thorn; ear piercing; 6
Liliaceae
Beargrass; Leaves; Baskets;
Sacahuista; Fiber; many; 4
Sacahuista; Leaves; Mats; 4
Sotol; Leaves; ties and rope; 4
Sotol; Stem; firestarter; 4
Sotol; Stem; many; 4
Moraceae
Osage Orange; Wood; many; 9
Texas Mulberry; Wood; Artifacts; 8 9
Pinaceae
Ponderosa Pine; Wood; many; 7
Southwestern White Pine; Wood; many; 7
Twoneedle Pinyon; Branches; Artifacts; 7
Twoneedle Pinyon; Leaves; Artifacts; 7
Twoneedle Pinyon; Pollen; Cermony; 7
Twoneedle Pinyon; Wood; Artifacts; 7
Poaceae
Blue Grama; Stem; Brushes and Brooms; 1 4 7
Common Reed; Stem; Artifacts; 8
Common Reed; Stem; Cermony; 8
Little Bluestem; Fiber; insulation; 1 3 7
Rosaceae
Apache Plume; Fiber; Padding; 7
Apache Plume; Wood; Cradle Board, baskets; 7
Black Cherry; Stem; Arrow Shafts; 7
Salicaceae
Rio Grande Cottonwood; Wood; many; 8
Willow; Bark; Baskets; 8
Willow; Stem; Arrow Shafts; 8
Willow; Stem; Baskets; 8
Willow; Stem; Switch for disciplining children; 8
Sapindaceae
Western Soapberry; Root/Tuber; Soap; 2 3 8 9
Western Soapberry; Wood; many; 2 3 8 9
Typhaceae
Broadleaf Cattail; Leaves; Rugs; 8
Ulmaceae
Hackberry; Wood; Artifacts; 3 8 9

Cooking

Agavaceae
Soaptree Yucca; Leaves; Drying Mescal Agave; 4
Liliaceae
Beargrass; Leaves; Preserving Fruit; 4
Beargrass; Leaves; Roasting Mescal; 4
Poaceae
Alkali Sacaton; Leaves; Steam Cooking; 8
Spike Muhly; Leaves; Steam Cooking; 4 7

Dye

Agavaceae
Plains Yucca; Leaves; Green; 2 5
Asteraceae
Hopi Tea Greenthread; Flower; Red-Brown; 6 8 9
Rocky Mountain Zinnia; Flower; Yellow; 1 4 5 6 9
Woolly Paperflower; Flower; Yellow; 1 4 5 6 7 9
Berberidaceae
Red Barberry; Root/Tuber; Yellow; 4 6 7
Krameriaceae
Littleleaf Ratany; Root/Tuber; Red; 4 5 6
Moraceae
Osage Orange; Root/Tuber; Yellow; 9
Orobanchaceae
Indian Paintbrush; Root/Tuber; Black; 7
Polygonaceae
Annual Buckwheat; Leaves; Brown; 2 3

Food

Agavaceae
Banana Yucca; Flower; Food; 4 7
Parry's Agave; Heart/Crown; Food; 4
Plains Yucca; flower; Food; 2 5
Plains Yucca; Leaves; Food; 2 5
Plains Yucca; stalk; Food; 2 5
Soaptree Yucca; Flower; Food; 4
Soaptree Yucca; Root/Tuber; Food; 4
Asclepiadaceae
Fringed Twinevine; Sap; Food; 5 6 8
Spider Milkweed; Leaves; gum; 5 6
Asteraceae
Louisiana Sagewort; Leaves; beverage; 7
New Mexico thistle; Leaves; Food; 4 6 7
Yellowspine Thistle; Leaves; Food; 4 6 7

Brassicaceae
Herb Sophia; Leaves; Food; 5 9
Mesa Pepperwort; Leaves; Food; 5 6 7 9
Shepherd's Purse; Seeds; Bread & Cake; 5 8 9
Cactaceae
Tree Cholla; Fruit/Pods; food; 1 4 7
Tree Cholla; Leaves; food; 1 4 7
Tree Cholla; Root/Tuber; food; 1 4 7
Chenopodiaceae
Fourwing Saltbush; Leaves; Food; 1 4 7 8 9
Goosefoot; Leaves; Food; 4 7 8 9
Goosefoot; Seeds; Food; 4 7 8 9
Lambsquarters; Leaves; Food; 4 7 8 9
Lambsquarters; Root/Tuber; Food; 4 7 8 9
Lambsquarters; Seeds; Food; 4 7 8 9
Pitseed Goosefoot; Leaves; Food; 4 7 8 9
Pitseed Goosefoot; Root/Tuber; Food; 4 7 8 9
Commelinaceae
Whitemouth Dayflower; Leaves; Food; 2 3
Cucurbitaceae
Missouri Gourd; Root/Tuber; Food; 1 4 5 7 9
Cupressaceae
Alligator Juniper; Fruit/Pods; Food; 7
Juniper; Leaves; Food; 7
Pinchot's Juniper; Fruit/Pods; Food; 4 7
Cyperaceae
Yellow Nutsedge; Root/Tuber; Food; 3 8
Ephedraceae
Torrey's Jointfir; Seeds; Food; 4 6
Fabaceae
Catclaw Acacia; Seeds; Food; 6
Honey Mesquite; Fruit/Pods; Food; 4 5 6 8 9
Honey Mesquite; Seeds; Bread & Cake; 4 5 6 8 9
Indian Rushpea; Root/Tuber; Food; 1 4 5 6 9
Purple Prairie Clover; Root/Tuber; Food; 1
Slimflower Scurfpea; Leaves; Food; 2 3
Whitethorn Acacia; Seeds; Food; 6
Fagaceae
Oak; Bark; Food; 7
Juncaceae
Arctic Rush; Root/Tuber; Food; 8
Lamiaceae
False Pennyroyal; Leaves; beverage; 4 7
False Pennyroyal; Leaves; seasoning; 4 7
Liliaceae
Geyer's Onion; Leaves; Food; 2 5
Geyer's Onion; Root/Tuber; Food; 2 5
Green Sotol; Heart/Crown; Food; 4
Sacahuista; Leaves; Food; 4
Sacahuista; Root/Tuber; Food; 4
Sacahuista; Stem; Food; 4
Sotol; Heart/Crown; beverage; 4
Sotol; Heart/Crown; Bread & Cake; 4
Malvaceae
Globemallow; Leaves; Food; 1 4 5 6 7 9
Globemallow; Root/Tuber; Food; 1 4 5 6 7 9
Moraceae
Texas Mulberry; Fruit/Pods; Bread & Cake; 8 9
Texas Mulberry; Fruit/Pods; Food; 8 9
Onagraceae
Whitest Eveningprimrose; Leaves; Food; 5 6 9
Orobanchaceae
Indian Paintbrush; Flower; nectar; 4
Indian Paintbrush; Leaves; Food; 4
Plantaginaceae
Plantain; Leaves; Food; 2 5 6
Poaceae
Common Reed; Leaves; Food; 8
Polygonaceae
Canaigre Dock; Leaves; Food; 3 5
Portulacaceae
Little Hogweed; Leaves; Food; 5 9
Pteridaceae
Rock Weed; Leaves; beverage; 4 7
Salicaceae
Rio Grande Cottonwood; Bark; Vitamin C; 8
Rio Grande Cottonwood; Bud; Candy; 8
Willow; Leaves; Food; 8
Typhaceae
Broadleaf Cattail; Fruit/Pods; Food; 8
Broadleaf Cattail; Leaves; Food; 8
Broadleaf Cattail; Root/Tuber; Food; 8
Ulmaceae
Netleaf Hackberry; Fruit/Pods; Food; 3 8 9
Siberian Elm; Leaves; Food; 8 9

Fuel

Cupressaceae
Alligator Juniper; Wood; fuel; 7
Juniper; Wood; fuel; 7
Pinchot's Juniper; Wood; fuel; 4 7
Ephedraceae
Torrey's Jointfir; Wood; fuel; 4 6
Fabaceae
Catclaw Acacia; Wood; fuel; 6
Featherplume; Wood; fuel; 1 6
Honey Mesquite; Wood; fuel; 4 5 6 8 9
Whitethorn Acacia; Wood; fuel; 6
Fagaceae
Oak; Wood; fuel; 7
Fouquieriaceae
Ocotillo; stem; fuel; 6
Ocotillo; Wood; fuel; 6
Pinaceae
Southwestern White Pine; Wood; fuel; 7
Twoneedle Pinyon; Wood; fuel; 7

Medicine

Agavaceae
Banana Yucca; Leaves; Unspecified; 4 7
Parry's Agave; Leaves; burns; 4
Amaranthaceae
Prostrate Pigweed; Leaves; smoked; 4 8 9
Anacardiaceae
Littleleaf Sumac; Flower; not specified; 8
Littleleaf Sumac; Wood; not specified; 8
Asteraceae
Cocklebur; Leaves; blood medicine; 8
Cocklebur; Root/Tuber; blood medicine; 8
Crownbeard; Leaves; fever; 4 8 9
Desert Holly; Leaves; tea for broken bones; 4 5 6
Dotted Gayfeather; Root/Tuber; urinary aid; 1
Fetid Marigold; Leaves; stings; 2 5 6 7 8 9
Gray's Feverfew; Leaves; burns; 4 6 8
Hopi Tea Greenthread; Flower; tea; 6 8 9
Littlehead Tarweed; Flower; many; 8
Louisiana Sagewort; Leaves; many; 7
Louisiana Sagewort; Leaves; smudge; 7
New Mexico thistle; Leaves; many; 4 6 7
Prairie Sagewort; Leaves; smoking with tobacco; 4 7
Prairie Sagewort; Leaves; smudge; 4 7

Pricklyleaf Dogweed; Leaves; smoking with tobacco; 5 6 9
Rocky Mountain Zinnia; Leaves; Many; 1 4 5 6 9
Sand Sagebrush; Leaves; many; 2 3
Threadleaf Ragwort; Leaves; many; 2 4 6
Woolly Paperflower; Flower; many; 1 4 5 6 7 9
Woolly Paperflower; Leaves; many; 1 4 5 6 7 9
Berberidaceae
Red Barberry; Root/Tuber; Medicine; 4 6 7
Boraginaceae
Cryptantha; Leaves; snakebite; 4 5
Brassicaceae
Fendler's Bladderpod; Leaves; stings; 5 6
Herb Sophia; Leaves; toothache; 5 9
Mesa Pepperwort; Leaves; Unspecified; 5 6 7 9
Shepherd's Purse; Leaves; many; 5 8 9
Touristplant, Spectacle Pod; Leaves; many; 2 3 5 6 9
Cactaceae
Prickly Pear Cactus; Leaves; Drug; 4 5 6
Tree Cholla; Flower; Diuretic; 1 4 7
Tree Cholla; Root/Tuber; Hair tonic; 1 4 7
Chenopodiaceae
Fourwing Saltbush; Leaves; many; 1 4 7 8 9
Fourwing Saltbush; Root/Tuber; many; 1 4 7 8 9
Lambsquarters; Leaves; many; 4 7 8 9
Prickly Russian Thistle; Leaves; stings; 1 4 5 6 7 8 9
Winterfat; Leaves; many; 1 5
Commelinaceae
Whitemouth Dayflower; Leaves; consumption aid; 2 3
Cupressaceae
Juniper; Branches; Medicine; 7
Juniper; Leaves; Drug; 7
Juniper; Leaves; Medicine; 7
Oneseed Juniper; Leaves; digestion; 7
Oneseed Juniper; Wood; ceremonial fires; 7
Ephedraceae
Torrey's Jointfir; Stem; many; 4 6
Equisetaceae
Scouring Rush; Stem; many; 8
Euphorbiaceae
Croton; Leaves; kidney infections; 2 6
Fabaceae
Featherplume; Leaves; Many; 1 6
Honey Mesquite; Fruit/Pods; earache; 4 5 6 8 9
Honey Mesquite; Fruit/Pods; Medicine; 4 5 6 8 9
Honey Mesquite; Leaves; antifungal; 4 5 6 8 9
Honey Mesquite; Leaves; Medicine; 4 5 6 8 9
Milkvetch; Leaves; emetic; 2 4 5 6 7
Slimflower Scurfpea; Leaves; consumption aid; 2 3
Twinleaf Senna; Leaves; many; 4 5 6
Fagaceae
Oak; Leaves; Medicine; 7
Fouquieriaceae
Ocotillo; Flower; Many; 6
Ocotillo; Leaves; many; 6
Krameriaceae
Littleleaf Ratany; Root/Tuber; wound care; 4 5 6
Lamiaceae
Canadian Mint; Leaves; many; 8
Drummond's Skullcap; Root/Tuber; many; 4
False Pennyroyal; Leaves; tea; 4 7
Hoary Rosemarymint; Leaves; many; 6
Horehound; Leaves; many; 5 9
Spotted Beebalm; Leaves; cough; 2 3 5 6
Liliaceae
Beargrass; Leaves; Insect-repellant; 4
Sacahuista; Root/Tuber; rheumatism; 4
Moraceae
Osage Orange; Root/Tuber; eye wash; 9
Nyctaginaceae
Snowball Sand Verbena; Flower; many; 3
Snowball Sand Verbena; Leaves; many; 3
Onagraceae
Whitest Eveningprimrose; Leaves; many; 5 6 9
Orobanchaceae
Indian Paintbrush; Leaves; many; 7
Pinaceae
Southwestern White Pine; Leaves; Drug; 7
Twoneedle Pinyon; Leaves; Medicine; 7
Plantaginaceae
Plantain; Leaves; many; 2 5 6
Poaceae
Big Bluestem; Root/Tuber; many; 1 2 3
Common Reed; Root/Tuber; diarrhea; 8
Common Reed; Stem; Drug; 8
Giant Dropseed; Stem; prayer sticks; 3
Little Bluestem; Stem; sores; 1 3 7
Sorghum; stem; Drug; 9
Polygonaceae
Knotweed; Leaves; unspecified; 8
Rosaceae
Apache Plume; Leaves; Unspecified; 7
Black Cherry; Bark; Antidiarrheal; 7
Black Cherry; Bark; Burn Dressing; 7
Salicaceae
Rio Grande Cottonwood; Bark; wound care; 8
Rio Grande Cottonwood; Leaves; Drug; 8
Rio Grande Cottonwood; Leaves; wound care; 8
Scrophulariaceae
Beardtongue; Leaves; emetic; 2 3
Solanaceae
Chinese Thorn-apple; Root/Tuber; many; 2 3 8
Desert Tobacco; Leaves; smoked; 6 8
Nightshade; Leaves; unspecified; 5 6 9
Typhaceae
Broadleaf Cattail; Pollen; Many; 8
Zygophyllaceae
Creosote Bush; Leaves; many; 6
Puncturevine; Leaves; unspecified; 6 9

Table 2. Summer Plant Availability: Major Use by Plant Family, Common Name, Plant Part, Specific Use, and Ecoregion

Artifacts

Agavaceae
Banana Yucca; Root/Tuber; Soap; 4 7
Banana Yucca; Stalk; Artifacts; 4 7
Banana Yucca; Thorn; sewing; 4 7
Parry's Agave; Leaves; Soap; 4
Parry's Agave; Leaves; ties and rope; 4
Parry's Agave; Thorn; Sewing; 4
Plains Yucca; Root/Tuber; Soap; 2 5
Soaptree Yucca; Leaves; ties and rope; 4
Soaptree Yucca; Root/Tuber; Soap; 4
Torrey's Yucca; Root/Tuber; Soap; 4 6

Anacardiaceae
Littleleaf Sumac; Stem; baskets; 8
Skunkbush Sumac; Bark; Baskets; 7
Skunkbush Sumac; Stem; Baskets; 7
Sumac; Wood; Artifacts;
Asclepiadaceae
Spider Milkweed; Fiber; Strings; 5 6
Bignoniaceae
Desert Willow; Wood; many; 8
Cactaceae
Nipple Beehive Cactus; Thorn; Weapon; 6
Chenopodiaceae
Fourwing Saltbush; Root/Tuber; Soap; 1 4 7 8 9
Cupressaceae
Juniper; Branches; Artifacts; 7
Juniper; Wood; Artifacts; 7
Fabaceae
Honey Mesquite; Root/Tuber; Cradle Board, baskets; 4 5 6 8 9
Slimflower Scurfpea; Stem; garlands; 2 3
Fagaceae
Gambel Oak; Leaves; mattress; 7
Gambel Oak; Wood; many; 7
Oak; Branches; Artifacts; 7
Oak; Leaves; Artifacts; 7
Oak; Wood; Artifacts; 7
Fouqueriaceae
Ocotillo; Branches; Shelter; 6
Ocotillo; stem; Many; 6
Ocotillo; Thorn; ear piercing; 6
Liliaceae
Beargrass; Leaves; Baskets; 4
Sacahuista; Fiber; many; 4
Sotol; Leaves; ties and rope; 4
Sotol; Stem; firestarter; 4
Sotol; Stem; many; 4
Moraceae
Osage Orange; Wood; many; 9
Texas Mulberry; Wood; Artifacts; 8 9
Pedaliaceae
Louisiana Ram's Horn; Fruit/Pods; baskets; 2 3 6
Pinaceae
Ponderosa Pine; Wood; many; 7
Southwestern White Pine; Wood; many; 7
Twoneedle Pinyon; Branches; Artifacts; 7
Twoneedle Pinyon; Leaves; Artifacts; 7
Twoneedle Pinyon; Wood; Artifacts; 7
Poaceae
Blue Grama; Stem; Brushes and Brooms; 1 4 7
Common Reed; Stem; Artifacts; 8
Common Reed; Stem; Cermony; 8
Little Bluestem; Fiber; insulation; 1 3 7
Sideoats Grama; Stem; Brushes and Brooms; 1 4 7
Rosaceae
Apache Plume; Fiber; Padding; 7
Apache Plume; Wood; Cradle Board, baskets; 7
Black Cherry; Stem; Arrow Shafts; 7
Salicaceae
Rio Grande Cottonwood; Wood; many; 8
Willow; Bark; Baskets; 8
Sapindaceae
Western Soapberry; Root/Tuber; Soap; 2 3 8 9
Western Soapberry; Wood; many; 2 3 8 9
Typhaceae
Broadleaf Cattail; Leaves; Rugs; 8
Ulmaceae
Hackberry; Wood; Artifacts; 3 8 9

Cooking

Agavaceae
Soaptree Yucca; Leaves; Drying Mescal Agave; 4
Liliaceae
Beargrass; Leaves; Preserving Fruit; 4
Beargrass; Leaves; Roasting Mescal; 4
Poaceae
Alkali Sacaton; Leaves; Steam Cooking; 8
Spike Muhly; Leaves; Steam Cooking; 4 7

Dye

Agavaceae
Plains Yucca; Leaves; Green; 2 5
Asteraceae
Broom Snakeweed; Flower; Yellow; 1 2 4 5 6 7 8 9
Hopi Tea Greenthread; Flower; Red-Brown; 6 8 9
Rocky Mountain Zinnia; Flower; Yellow; 1 4 5 6 9
Woolly Paperflower; Flower; Yellow; 1 4 5 6 7 9
Berberidaceae
Red Barberry; Fruit/Pods; Yellow; 4 6 7
Red Barberry; Root/Tuber; Yellow; 4 6 7
Krameriaceae
Littleleaf Ratany; Root/Tuber; Red; 4 5 6
Moraceae
Osage Orange; Root/Tuber; Yellow; 9
Orobanchaceae
Indian Paintbrush; Root/Tuber; Black; 7
Pedaliaceae
Louisiana Ram's Horn; Fruit/Pods; Black; 2 3 6
Polygonaceae
Annual Buckwheat; Leaves; Brown; 2 3
Rosaceae
Black Cherry; Fruit/Pods; Green; 7

Food

Agavaceae
Banana Yucca; Flower; Food; 4 7
Parry's Agave; Heart/Crown; Food; 4
Plains Yucca; flower; Food; 2 5
Plains Yucca; Leaves; Food; 2 5
Plains Yucca; stalk; Food; 2 5
Soaptree Yucca; Flower; Food; 4
Soaptree Yucca; Root/Tuber; Food; 4
Torrey's Yucca; Seeds; Bread & Cake; 4 6
Amaranthaceae
Prostrate Pigweed; Leaves; Food; 4 8 9
Prostrate Pigweed; Root/Tuber; Food; 4 8 9
Prostrate Pigweed; Seeds; Bread & Cake; 4 8 9
Anacardiaceae
Littleleaf Sumac; Fruit/Pods; Food; 8
Littleleaf Sumac; Seeds; Food; 8
Skunkbush Sumac; Fruit/Pods; Food; 7
Sumac; Fruit/Pods; Food; 2 7 8
Apiaceae
Wild Celery; Leaves; seasoning; 4
Wild Celery; Root/Tuber; Food; 4
Asclepiadaceae
Fringed Twinevine; Sap; Food; 5 6 8
Spider Milkweed; Leaves; gum; 5 6
Spider Milkweed; Sap; Candy; 5 6
Spider Milkweed; Stem; gum; 5 6

Asteraceae
Louisiana Sagewort; Leaves; beverage; 7
Louisiana Sagewort; Stem; beverage; 7
New Mexico thistle; Leaves; Food; 4 6 7
Yellowspine Thistle; Leaves; Food; 4 6 7
Berberidaceae
Red Barberry; Fruit/Pods; Food; 4 6 7
Boraginaceae
Heliotrope; Seeds; Food; 3
Cactaceae
Christmas Cactus; Fruit/Pods; food; 4 7
Graham's Nipple Cactus; Fruit/Pods; Food; 4
Pinkflower Hedgehog Cactus; Fruit/Pods; Food; 4
Prickly Pear Cactus; Fruit/Pods; Food; 4 5 6
Scarlet Hedgehog Cactus; Fruit/Pods; Food; 4 6
Chenopodiaceae
Fourwing Saltbush; Leaves; Food; 1 4 7 8 9
Goosefoot; Leaves; Food;
Goosefoot; Seeds; Food;
Lambsquarters; Leaves; Food; 4 7 8 9
Lambsquarters; Root/Tuber; Food; 4 7 8 9
Lambsquarters; Seeds; Food; 4 7 8 9
Pitseed Goosefoot; Leaves; Food; 4 7 8 9
Pitseed Goosefoot; Root/Tuber; Food; 4 7 8 9
Prickly Russian Thistle; Seeds; Food; 1 4 5 6 7 8 9
Commelinaceae
Whitemouth Dayflower; Leaves; Food; 2 3
Whitemouth Dayflower; Root/Tuber; Food; 2 3
Cucurbitaceae
Watermelon; Fruit/Pods; Food; 2 9
Cupressaceae
Alligator Juniper; Fruit/Pods; Food; 7
Juniper; Leaves; Food;
Oneseed Juniper; Fruit/Pods; Food; 7
Oneseed Juniper; Root/Tuber; Food; 7
Pinchot's Juniper; Fruit/Pods; Food; 4 7
Ephedraceae
Torrey's Jointfir; Seeds; Food; 4 6
Fabaceae
Honey Mesquite; Fruit/Pods; Food; 4 5 6 8 9
Honey Mesquite; Seeds; Bread & Cake; 4 5 6 8 9
Slimflower Scurfpea; Leaves; Food; 2 3
Fagaceae
Gambel Oak; Seeds; Food; 7
Havard Oak; Seeds; Food; 2 3
Oak; Bark; Food;
Oak; Nuts; Food;
Lamiaceae
False Pennyroyal; Leaves; beverage; 4 7
False Pennyroyal; Leaves; seasoning; 4 7
Liliaceae
Geyer's Onion; Leaves; Food; 2 5
Geyer's Onion; Root/Tuber; Food; 2 5
Green Sotol; Heart/Crown; Food; 4
Sotol; Heart/Crown; beverage;
Sotol; Heart/Crown; Bread & Cake;
Malvaceae
Globemallow; Fruit/Pods; Food; 1 4 5 6 7 9
Globemallow; Leaves; Food; 1 4 5 6 7 9
Moraceae
Texas Mulberry; Fruit/Pods; Bread & Cake; 8 9
Texas Mulberry; Fruit/Pods; Food; 8 9
Nyctaginaceae
Snowball Sand Verbena; Root/Tuber; Food; 3
Onagraceae
Sundrops; Fruit/Pods; Food; 2 3
Whitest Eveningprimrose; Fruit/Pods; Food; 5 6 9
Whitest Eveningprimrose; Seeds; Food; 5 6 9
Orobanchaceae
Indian Paintbrush; Flower; nectar; 7
Indian Paintbrush; Leaves; Food; 7
Pedaliaceae
Louisiana Ram's Horn; Fruit/Pods; Food; 2 3 6
Louisiana Ram's Horn; Seeds; Food; 2 3 6
Plantaginaceae
Plantain; Leaves; Food; 2 5 6
Plantain; Seeds; Food; 2 5 6
Poaceae
Blue Grama; Seeds; Food; 1 4 7
Common Reed; Leaves; Food; 8
Corn; Seeds; Food; 9
Portulacaceae
Little Hogweed; Leaves; Food; 5 9
Pteridaceae
Rock Weed; Leaves; beverage; 4 7
Rhamnaceae
Javelina Bush; Fruit/Pods; Food; 6
Lotebush; Fruit/Pods; Food; 4 6
Rosaceae
Black Cherry; Fruit/Pods; Food; 7
Chokecherry; Fruit/Pods; Food; 7 8
Salicaceae
Rio Grande Cottonwood; Bark; Vitamin C; 8
Rio Grande Cottonwood; Bud; Candy; 8
Scrophulariaceae
Balloonbush; Fruit/Pods; Food; 2 5 6
Solanaceae
Chinese Lantern; Fruit/Pods; Food; 9
Five Eyes; Seeds; Food; 5 6 9
Groundcherry; Fruit/Pods; Food; 5 6
Pale Wolfberry; Fruit/Pods; Food; 4 6 7 8
Typhaceae
Broadleaf Cattail; Fruit/Pods; Food; 8
Broadleaf Cattail; Leaves; Food; 8
Broadleaf Cattail; Seeds; Food; 8
Ulmaceae
Hackberry; Fruit/Pods; Food; 3 8 9
Netleaf Hackberry; Fruit/Pods; Food; 3 8 9
Siberian Elm; Leaves; Food; 8 9
Vitaceae
Canyon Grape; Fruit/Pods; Food; 7 8

Fuel

Cupressaceae
Alligator Juniper; Wood; fuel; 7
Juniper; Wood; fuel; 7
Pinchot's Juniper; Wood; fuel; 4 7
Ephedraceae
Torrey's Jointfir; Wood; fuel; 4 6
Fabaceae
Catclaw Acacia; Wood; fuel; 6
Featherplume; Wood; fuel; 1 6
Honey Mesquite; Wood; fuel; 4 5 6 8 9
Whitethorn Acacia; Wood; fuel; 6
Fagaceae
Oak; Wood; fuel; 7
Fouquieriaceae
Ocotillo; stem; fuel; 6
Ocotillo; Wood; fuel; 6

Pinaceae
Southwestern White Pine; Wood; fuel; 7
Twoneedle Pinyon; Wood; fuel; 7

Medicine

Agavaceae
Banana Yucca; Leaves; Unspecified; 4 7
Parry's Agave; Leaves; burns; 4
Amaranthaceae
Prostrate Pigweed; Leaves; smoked; 4 8 9
Anacardiaceae
Littleleaf Sumac; Wood; not specified; 8
Sumac; Fruit/Pods; Medicine; 2 7 8
Asteraceae
Broom Snakeweed; Stem; Unspecified; 1 2 4 5 6 7 8 9
Cocklebur; Leaves; blood medicine; 8
Cocklebur; Root/Tuber; blood medicine; 8
Crownbeard; Leaves; fever; 4 8 9
Desert Holly; Leaves; tea for broken bones; 4 5 6
Dotted Gayfeather; Root/Tuber; urinary aid; 1
Fetid Marigold; Leaves; stings; 2 5 6 7 8 9
Gray's Feverfew; Leaves; burns; 4 6 8
Hopi Tea Greenthread; Flower; tea; 6 8 9
Hopi Tea Greenthread; Stem; tea; 6 8 9
Littlehead Tarweed; Flower; many; 8
Louisiana Sagewort; Leaves; many; 7
Louisiana Sagewort; Leaves; smudge; 7
New Mexico thistle; Leaves; many; 4 6 7
Prairie Sagewort; Leaves; smoking with tobacco; 4 7
Prairie Sagewort; Leaves; smudge; 4 7
Pricklyleaf Dogweed; Leaves; smoking with tobacco; 5 6 9
Rocky Mountain Zinnia; Leaves; Many; 1 4 5 6 9
Sand Sagebrush; Leaves; many; 2 3
Sunflower; Sap; Medicine; 8 9
Threadleaf Ragwort; Leaves; many; 2 4 6
Woolly Paperflower; Flower; many; 1 4 5 6 7 9
Woolly Paperflower; Leaves; many; 1 4 5 6 7 9
Yellowspine Thistle; Flower; wound care; 4 6 7
Berberidaceae
Red Barberry; Fruit/Pods; Drug; 4 6 7
Red Barberry; Fruit/Pods; many; 4 6 7
Red Barberry; Root/Tuber; Medicine; 4 6 7
Boraginaceae
Cryptantha; Leaves; snakebite; 4 5
Brassicaceae
Fendler's Bladderpod; Leaves; stings; 5 6
Touristplant, Spectacle Pod; Leaves; many; 2 3 5 6 9
Cactaceae
Christmas Cactus; Fruit/Pods; narcotic; 4 7
Prickly Pear Cactus; Leaves; Drug; 4 5 6
Prickly Pear Cactus; Stem; wound care; 4 5 6
Scarlet Hedgehog Cactus; Stem; heart stimulant; 4 6
Chenopodiaceae
Fourwing Saltbush; Leaves; many; 1 4 7 8 9
Fourwing Saltbush; Root/Tuber; many; 1 4 7 8 9
Lambsquarters; Leaves; many; 4 7 8 9
Prickly Russian Thistle; Leaves; stings; 1 4 5 6 7 8 9
Winterfat; Leaves; many; 1 5
Commelinaceae
Whitemouth Dayflower; Leaves; consumption aid; 2 3
Cucurbitaceae
Missouri Gourd; Fruit/Pods; Drug; 1 4 5 7 9
Cupressaceae
Juniper; Branches; Medicine; 7
Juniper; Leaves; Drug; 7
Juniper; Leaves; Medicine; 7
Oneseed Juniper; Fruit/Pods; Diuretic; 7
Oneseed Juniper; Leaves; digestion; 7
Oneseed Juniper; Root/Tuber; energy drink for infants; 7
Oneseed Juniper; Wood; ceremonial fires; 7
Ephedraceae
Torrey's Jointfir; Stem; many; 4 6
Equisetaceae
Scouring Rush; Stem; many; 8
Euphorbiaceae
Croton; Leaves; kidney infections; 2 6
Sandmat; Stem; many; 2 3 5
Fabaceae
Featherplume; Leaves; Many; 1 6
Honey Mesquite; Fruit/Pods; earache; 4 5 6 8 9
Honey Mesquite; Fruit/Pods; Medicine; 4 5 6 8 9
Honey Mesquite; Leaves; antifungal; 4 5 6 8 9
Honey Mesquite; Leaves; Medicine; 4 5 6 8 9
Mescal Bean; Seeds; earache; 4
Milkvetch; Leaves; emetic; 2 4 5 6 7
Slimflower Scurfpea; Leaves; consumption aid; 2 3
Twinleaf Senna; Leaves; many; 4 5 6
Fagaceae
Gambel Oak; Seeds; Potency aid; 7
Oak; Leaves; Medicine; 7
Fouquieriaceae
Ocotillo; Flower; Many; 6
Ocotillo; Leaves; many; 6
Krameriaceae
Littleleaf Ratany; Root/Tuber; wound care; 4 5 6
Lamiaceae
Canadian Mint; Leaves; many; 8
Drummond's Skullcap; Root/Tuber; many; 4
False Pennyroyal; Leaves; tea; 4 7
Hoary Rosemarymint; Leaves; many; 6
Horehound; Leaves; many; 5 9
Spotted Beebalm; Leaves; cough; 2 3 5 6
Liliaceae
Beargrass; Leaves; Insect-repellant; 4
Moraceae
Osage Orange; Root/Tuber; eye wash; 9
Nyctaginaceae
Snowball Sand Verbena; Flower; many; 3
Snowball Sand Verbena; Leaves; many; 3
Snowball Sand Verbena; Root/Tuber; many; 3
Orobanchaceae
Indian Paintbrush; Leaves; many; 7
Papaveraceae
Hedgehog Pricklypoppy; Seeds; many; 5 9
Pedaliaceae
Louisiana Ram's Horn; Fruit/Pods; Medicine; 2 3 6
Louisiana Ram's Horn; Fruit/Pods; wart removal; 2 3 6
Pinaceae
Southwestern White Pine; Leaves; Drug; 7
Twoneedle Pinyon; Leaves; Medicine; 7
Plantaginaceae
Plantain; Leaves; many; 2 5 6
Poaceae
Big Bluestem; Root/Tuber; many; 1 2 3
Blue Grama; Stem; Many; 1 4 7
Common Reed; Root/Tuber; diarrhea; 8
Common Reed; Stem; Drug; 8
Giant Dropseed; Stem; prayer sticks; 3
Little Bluestem; Stem; sores; 1 3 7
Sorghum; stem; Drug; 9

Polygonaceae
Knotweed; Leaves; unspecified; 8
Rosaceae
Apache Plume; Leaves; Unspecified; 7
Black Cherry; Bark; Antidiarrheal; 7
Black Cherry; Bark; Burn Dressing; 7
Chokecherry; Fruit/Pods; Medicine; 7 8
Salicaceae
Rio Grande Cottonwood; Bark; wound care; 8
Rio Grande Cottonwood; Leaves; Drug; 8
Rio Grande Cottonwood; Leaves; wound care; 8
Sapindaceae
Western Soapberry; Sap; wound care; 2 3 8 9
Scrophulariaceae
Balloonbush; Leaves; antiinflammitory; 2 5 6
Beardtongue; Leaves; emetic; 2 3
Solanaceae
Chinese Lantern; Root/Tuber; Grippe; 9
Chinese Thorn-apple; Root/Tuber; many; 2 3 8
Desert Tobacco; Leaves; smoked; 6 8
Nightshade; Leaves; unspecified; 5 6 9
Typhaceae
Broadleaf Cattail; Pollen; Many; 8
Zygophyllaceae
Creosote Bush; Leaves; many; 6
Puncturevine; Leaves; unspecified; 6 9

Table 3. Fall Plant Availability: Major Use by Plant Family, Common Name, Plant Part, Specific Use, and Ecoregion

Artifacts

Agavaceae
Banana Yucca; Root/Tuber; Soap; 4 7
Banana Yucca; Stalk; Artifacts; 4 7
Banana Yucca; Thorn; sewing; 4 7
Parry's Agave; Leaves; Soap; 4
Parry's Agave; Leaves; ties and rope; 4
Parry's Agave; Thorn; Sewing; 4
Plains Yucca; Root/Tuber; Soap; 2 5
Soaptree Yucca; Leaves; ties and rope; 4
Soaptree Yucca; Root/Tuber; Soap; 4
Torrey's Yucca; Root/Tuber; Soap; 4 6
Anacardiaceae
Littleleaf Sumac; Stem; baskets; 8
Skunkbush Sumac; Bark; Baskets; 7
Skunkbush Sumac; Stem; Baskets; 7
Sumac; Wood; Artifacts;
Asclepiadaceae
Spider Milkweed; Fiber; Strings; 5 6
Bignoniaceae
Desert Willow; Wood; many; 8
Cactaceae
Nipple Beehive Cactus; Thorn; Weapon; 6
Chenopodiaceae
Fourwing Saltbush; Root/Tuber; Soap; 1 4 7 8 9
Cupressaceae
Juniper; Branches; Artifacts;
Juniper; Wood; Artifacts;
Fabaceae
Honey Mesquite; Root/Tuber; Cradle Board, baskets; 4 5 6 8 9
Slimflower Scurfpea; Stem; garlands; 2 3
Fagaceae
Gambel Oak; Leaves; mattress; 7
Gambel Oak; Wood; many; 7
Oak; Branches; Artifacts; 7
Oak; Leaves; Artifacts; 7
Oak; Wood; Artifacts; 7
Fouqueriaceae
Ocotillo; Branches; Shelter; 6
Ocotillo; stem; Many; 6
Ocotillo; Thorn; ear piercing; 6
Liliaceae
Beargrass; Leaves; Baskets; 4
Sacahuista; Fiber; many; 4
Sotol; Leaves; ties and rope; 4
Sotol; Stem; firestarter; 4
Sotol; Stem; many; 4
Moraceae
Osage Orange; Wood; many; 9
Texas Mulberry; Wood; Artifacts; 8 9
Pedaliaceae
Louisiana Ram's Horn; Fruit/Pods; baskets; 2 3 6
Pinaceae
Ponderosa Pine; Wood; many; 7
Southwestern White Pine; Wood; many; 7
Twoneedle Pinyon; Branches; Artifacts; 7
Twoneedle Pinyon; Leaves; Artifacts; 7
Twoneedle Pinyon; Wood; Artifacts; 7
Poaceae
Blue Grama; Stem; Brushes and Brooms; 1 4 7
Common Reed; Stem; Artifacts; 8
Common Reed; Stem; Cermony; 8
Little Bluestem; Fiber; insulation; 1 3 7
Sideoats Grama; Stem; Brushes and Brooms;
Rosaceae
Apache Plume; Fiber; Padding; 7
Apache Plume; Wood; Cradle Board, baskets; 7
Black Cherry; Stem; Arrow Shafts; 7
Salicaceae
Rio Grande Cottonwood; Wood; many; 8
Willow; Bark; Baskets; 8
Sapindaceae
Western Soapberry; Root/Tuber; Soap; 2 3 8 9
Western Soapberry; Wood; many; 2 3 8 9
Typhaceae
Broadleaf Cattail; Leaves; Rugs; 8
Ulmaceae
Hackberry; Wood; Artifacts; 3 8 9

Cooking

Agavaceae
Soaptree Yucca; Leaves; Drying Mescal Agave; 4
Liliaceae
Beargrass; Leaves; Preserving Fruit; 4
Beargrass; Leaves; Roasting Mescal; 4
Poaceae
Alkali Sacaton; Leaves; Steam Cooking; 8
Spike Muhly; Leaves; Steam Cooking; 4 7

Dye

Agavaceae
Plains Yucca; Leaves; Green; 2 5
Asteraceae
Broom Snakeweed; Flower; Yellow; 1 2 4 5 6 7 8 9
Hopi Tea Greenthread; Flower; Red-Brown; 6 8 9
Rocky Mountain Zinnia; Flower; Yellow; 1 4 5 6 9
Woolly Paperflower; Flower; Yellow; 1 4 5 6 7 9
Berberidaceae
Red Barberry; Fruit/Pods; Yellow; 4 6 7
Red Barberry; Root/Tuber; Yellow; 4 6 7

Krameriaceae
Littleleaf Ratany; Root/Tuber; Red; 4 5 6
Moraceae
Osage Orange; Root/Tuber; Yellow; 9
Orobanchaceae
Indian Paintbrush; Root/Tuber; Black; 7
Pedaliaceae
Louisiana Ram's Horn; Fruit/Pods; Black; 2 3 6
Polygonaceae
Annual Buckwheat; Leaves; Brown; 2 3
Rosaceae
Black Cherry; Fruit/Pods; Green; 7

Food

Agavaceae
Banana Yucca; Flower; Food; 4 7
Parry's Agave; Heart/Crown; Food; 4
Plains Yucca; flower; Food; 2 5
Plains Yucca; Leaves; Food; 2 5
Plains Yucca; stalk; Food; 2 5
Soaptree Yucca; Flower; Food; 4
Soaptree Yucca; Root/Tuber; Food; 4
Torrey's Yucca; Seeds; Bread & Cake; 4 6
Amaranthaceae
Prostrate Pigweed; Leaves; Food; 4 8 9
Prostrate Pigweed; Root/Tuber; Food; 4 8 9
Prostrate Pigweed; Seeds; Bread & Cake; 4 8 9
Anacardiaceae
Littleleaf Sumac; Fruit/Pods; Food; 8
Littleleaf Sumac; Seeds; Food; 8
Skunkbush Sumac; Fruit/Pods; Food; 7
Sumac; Fruit/Pods; Food; 2 7 8
Apiaceae
Wild Celery; Leaves; seasoning; 4
Wild Celery; Root/Tuber; Food; 4
Asclepiadaceae
Fringed Twinevine; Sap; Food; 5 6 8
Spider Milkweed; Leaves; gum; 5 6
Spider Milkweed; Sap; Candy; 5 6
Spider Milkweed; Stem; gum; 5 6
Asteraceae
Louisiana Sagewort; Leaves; beverage; 7
Louisiana Sagewort; Stem; beverage; 7
New Mexico thistle; Leaves; Food; 4 6 7
Yellowspine Thistle; Leaves; Food; 4 6 7
Berberidaceae
Red Barberry; Fruit/Pods; Food; 4 6 7
Boraginaceae
Heliotrope; Seeds; Food; 3
Cactaceae
Christmas Cactus; Fruit/Pods; food; 4 7
Graham's Nipple Cactus; Fruit/Pods; Food; 4
Pinkflower Hedgehog Cactus; Fruit/Pods; Food; 4
Prickly Pear Cactus; Fruit/Pods; Food; 4 5 6
Scarlet Hedgehog Cactus; Fruit/Pods; Food; 4 6
Chenopodiaceae
Fourwing Saltbush; Leaves; Food; 1 4 7 8 9
Goosefoot; Leaves; Food; 4 7 8 9
Goosefoot; Seeds; Food; 4 7 8 9
Lambsquarters; Leaves; Food; 4 7 8 9
Lambsquarters; Root/Tuber; Food; 4 7 8 9
Lambsquarters; Seeds; Food; 4 7 8 9
Pitseed Goosefoot; Leaves; Food; 4 7 8 9
Pitseed Goosefoot; Root/Tuber; Food; 4 7 8 9
Prickly Russian Thistle; Seeds; Food; 1 4 5 6 7 8 9
Commelinaceae
Whitemouth Dayflower; Leaves; Food; 2 3
Whitemouth Dayflower; Root/Tuber; Food; 2 3
Cucurbitaceae
Watermelon; Fruit/Pods; Food; 2 9
Cupressaceae
Alligator Juniper; Fruit/Pods; Food; 7
Juniper; Leaves; Food; 7
Oneseed Juniper; Fruit/Pods; Food; 7
Oneseed Juniper; Root/Tuber; Food; 7
Pinchot's Juniper; Fruit/Pods; Food; 4 7
Ephedraceae
Torrey's Jointfir; Seeds; Food; 4 6
Fabaceae
Honey Mesquite; Fruit/Pods; Food; 4 5 6 8 9
Honey Mesquite; Seeds; Bread & Cake; 4 5 6 8 9
Slimflower Scurfpea; Leaves; Food; 2 3
Fagaceae
Gambel Oak; Seeds; Food; 7
Havard Oak; Seeds; Food; 2 3
Oak; Bark; Food; 7
Oak; Nuts; Food; 7
Lamiaceae
False Pennyroyal; Leaves; beverage; 4 7
False Pennyroyal; Leaves; seasoning; 4 7
Liliaceae
Geyer's Onion; Leaves; Food; 2 5
Geyer's Onion; Root/Tuber; Food; 2 5
Green Sotol; Heart/Crown; Food; 4
Sotol; Heart/Crown; beverage; 4
Sotol; Heart/Crown; Bread & Cake; 4
Malvaceae
Globemallow; Fruit/Pods; Food; 1 4 5 6 7 9
Globemallow; Leaves; Food; 1 4 5 6 7 9
Moraceae
Texas Mulberry; Fruit/Pods; Bread & Cake; 8 9
Texas Mulberry; Fruit/Pods; Food; 8 9
Nyctaginaceae
Snowball Sand Verbena; Root/Tuber; Food; 3
Onagraceae
Sundrops; Fruit/Pods; Food; 2 3
Whitest Eveningprimrose; Fruit/Pods; Food; 5 6 9
Whitest Eveningprimrose; Seeds; Food; 5 6 9
Orobanchaceae
Indian Paintbrush; Flower; nectar; 7
Indian Paintbrush; Leaves; Food; 7
Pedaliaceae
Louisiana Ram's Horn; Fruit/Pods; Food; 2 3 6
Louisiana Ram's Horn; Seeds; Food; 2 3 6
Plantaginaceae
Plantain; Leaves; Food; 2 5 6
Plantain; Seeds; Food; 2 5 6
Poaceae
Blue Grama; Seeds; Food; 1 4 7
Common Reed; Leaves; Food; 8
Corn; Seeds; Food; 9
Portulacaceae
Little Hogweed; Leaves; Food; 5 9
Pteridaceae
Rock Weed; Leaves; beverage; 4 7
Rhamnaceae
Javelina Bush; Fruit/Pods; Food; 6
Lotebush; Fruit/Pods; Food; 4 6

Rosaceae
Black Cherry; Fruit/Pods; Food; 7
Chokecherry; Fruit/Pods; Food; 7 8
Salicaceae
Rio Grande Cottonwood; Bark; Vitamin C; 8
Rio Grande Cottonwood; Bud; Candy; 8
Scrophulariaceae
Balloonbush; Fruit/Pods; Food; 2 5 6
Solanaceae
Chinese Lantern; Fruit/Pods; Food; 9
Five Eyes; Seeds; Food; 5 6 9
Groundcherry; Fruit/Pods; Food; 5 6
Pale Wolfberry; Fruit/Pods; Food; 4 6 7 8
Typhaceae
Broadleaf Cattail; Fruit/Pods; Food; 8
Broadleaf Cattail; Leaves; Food; 8
Broadleaf Cattail; Seeds; Food; 8
Ulmaceae
Hackberry; Fruit/Pods; Food; 3 8 9
Netleaf Hackberry; Fruit/Pods; Food; 3 8 9
Siberian Elm; Leaves; Food; 8 9
Vitaceae
Canyon Grape; Fruit/Pods; Food; 7 8

Fuel

Cupressaceae
Alligator Juniper; Wood; fuel; 7
Juniper; Wood; fuel; 7
Pinchot's Juniper; Wood; fuel; 4 7
Ephedraceae
Torrey's Jointfir; Wood; fuel; 4 6
Fabaceae
Catclaw Acacia; Wood; fuel; 6
Featherplume; Wood; fuel; 1 6
Honey Mesquite; Wood; fuel; 4 5 6 8 9
Whitethorn Acacia; Wood; fuel; 6
Fagaceae
Oak; Wood; fuel; 7
Fouquieriaceae
Ocotillo; stem; fuel; 6
Ocotillo; Wood; fuel; 6
Pinaceae
Southwestern White Pine; Wood; fuel; 7
Twoneedle Pinyon; Wood; fuel; 7

Medicine

Agavaceae
Banana Yucca; Leaves; Unspecified; 4 7
Parry's Agave; Leaves; burns; 4
Amaranthaceae
Prostrate Pigweed; Leaves; smoked; 4 8 9
Anacardiaceae
Littleleaf Sumac; Wood; not specified; 8
Sumac; Fruit/Pods; Medicine; 2 7 8
Asteraceae
Broom Snakeweed; Stem; Unspecified; 1 2 4 5 6 7 8 9
Cocklebur; Leaves; blood medicine; 8
Cocklebur; Root/Tuber; blood medicine; 8
Crownbeard; Leaves; fever; 4 8 9
Desert Holly; Leaves; tea for broken bones; 4 5 6
Dotted Gayfeather; Root/Tuber; urinary aid; 1
Fetid Marigold; Leaves; stings; 2 5 6 7 8 9
Gray's Feverfew; Leaves; burns; 4 6 8
Hopi Tea Greenthread; Flower; tea; 6 8 9
Hopi Tea Greenthread; Stem; tea; 6 8 9
Littlehead Tarweed; Flower; many; 8
Louisiana Sagewort; Leaves; many; 7
Louisiana Sagewort; Leaves; smudge; 7
New Mexico thistle; Leaves; many; 4 6 7
Prairie Sagewort; Leaves; smoking with tobacco; 4 7
Prairie Sagewort; Leaves; smudge; 4 7
Pricklyleaf Dogweed; Leaves; smoking with tobacco; 5 6 9
Rocky Mountain Zinnia; Leaves; Many; 1 4 5 6 9
Sand Sagebrush; Leaves; many; 2 3
Sunflower; Sap; Medicine; 8 9
Threadleaf Ragwort; Leaves; many; 2 4 6
Woolly Paperflower; Flower; many; 1 4 5 6 7 9
Woolly Paperflower; Leaves; many; 1 4 5 6 7 9
Yellowspine Thistle; Flower; wound care; 4 6 7
Berberidaceae
Red Barberry; Fruit/Pods; Drug; 4 6 7
Red Barberry; Fruit/Pods; many; 4 6 7
Red Barberry; Root/Tuber; Medicine; 4 6 7
Boraginaceae
Cryptantha; Leaves; snakebite; 4 5
Brassicaceae
Fendler's Bladderpod; Leaves; stings; 5 6
Touristplant, Spectacle Pod; Leaves; many; 2 3 5 6 9
Cactaceae
Christmas Cactus; Fruit/Pods; narcotic; 4 7
Prickly Pear Cactus; Leaves; Drug; 4 5 6
Prickly Pear Cactus; Stem; wound care; 4 5 6
Scarlet Hedgehog Cactus; Stem; heart stimulant; 4 6
Chenopodiaceae
Fourwing Saltbush; Leaves; many; 1 4 7 8 9
Fourwing Saltbush; Root/Tuber; many; 1 4 7 8 9
Lambsquarters; Leaves; many; 4 7 8 9
Prickly Russian Thistle; Leaves; stings; 1 4 5 6 7 8 9
Winterfat; Leaves; many; 1 5
Commelinaceae
Whitemouth Dayflower; Leaves; consumption aid; 2 3
Cucurbitaceae
Missouri Gourd; Fruit/Pods; Drug; 1 4 5 7 9
Cupressaceae
Juniper; Branches; Medicine; 7
Juniper; Leaves; Drug; 7
Juniper; Leaves; Medicine; 7
Oneseed Juniper; Fruit/Pods; Diuretic; 7
Oneseed Juniper; Leaves; digestion; 7
Oneseed Juniper; Root/Tuber; energy drink for infants; 7
Oneseed Juniper; Wood; ceremonial fires; 7
Ephedraceae
Torrey's Jointfir; Stem; many; 4 6
Equisetaceae
Scouring Rush; Stem; many; 8
Euphorbiaceae
Croton; Leaves; kidney infections; 2 6
Sandmat; Stem; many; 2 3 5
Fabaceae
Featherplume; Leaves; Many; 1 6
Honey Mesquite; Fruit/Pods; earache; 4 5 6 8 9
Honey Mesquite; Fruit/Pods; Medicine; 4 5 6 8 9
Honey Mesquite; Leaves; antifungal; 4 5 6 8 9
Honey Mesquite; Leaves; Medicine; 4 5 6 8 9
Mescal Bean; Seeds; earache; 4
Milkvetch; Leaves; emetic; 2 4 5 6 7
Slimflower Scurfpea; Leaves; consumption aid; 2 3
Twinleaf Senna; Leaves; many; 4 5 6
Fagaceae
Gambel Oak; Seeds; Potency aid; 7
Oak; Leaves; Medicine; 7

Fouquieriaceae
Ocotillo; Flower; Many; 6
Ocotillo; Leaves; many; 6
Krameriaceae
Littleleaf Ratany; Root/Tuber; wound care; 4 5 6
Lamiaceae
Canadian Mint; Leaves; many; 8
Drummond's Skullcap; Root/Tuber; many; 4
False Pennyroyal; Leaves; tea; 4 7
Hoary Rosemarymint; Leaves; many; 6
Horehound; Leaves; many; 5 9
Spotted Beebalm; Leaves; cough; 2 3 5 6
Liliaceae
Beargrass; Leaves; Insect-repellant; 4
Moraceae
Osage Orange; Root/Tuber; eye wash; 9
Nyctaginaceae
Snowball Sand Verbena; Flower; many; 3
Snowball Sand Verbena; Leaves; many; 3
Snowball Sand Verbena; Root/Tuber; many; 3
Orobanchaceae
Indian Paintbrush; Leaves; many; 7
Papaveraceae
Hedgehog Pricklypoppy; Seeds; many; 5 9
Pedaliaceae
Louisiana Ram's Horn; Fruit/Pods; Medicine; 2 3 6
Louisiana Ram's Horn; Fruit/Pods; wart removal; 2 3 6
Pinaceae
Southwestern White Pine; Leaves; Drug; 7
Twoneedle Pinyon; Leaves; Medicine; 7
Plantaginaceae
Plantain; Leaves; many; 2 5 6
Poaceae
Big Bluestem; Root/Tuber; many; 1 2 3
Blue Grama; Stem; Many; 1 4 7
Common Reed; Root/Tuber; diarrhea; 8
Common Reed; Stem; Drug; 8
Giant Dropseed; Stem; prayer sticks; 3
Little Bluestem; Stem; sores; 1 3 7
Sorghum; stem; Drug; 9
Polygonaceae
Knotweed; Leaves; unspecified; 8
Rosaceae
Apache Plume; Leaves; Unspecified; 7
Black Cherry; Bark; Antidiarrheal; 7
Black Cherry; Bark; Burn Dressing; 7
Chokecherry; Fruit/Pods; Medicine; 7 8
Salicaceae
Rio Grande Cottonwood; Bark; wound care; 8
Rio Grande Cottonwood; Leaves; Drug; 8
Rio Grande Cottonwood; Leaves; wound care; 8
Sapindaceae
Western Soapberry; Sap; wound care; 2 3 8 9
Scrophulariaceae
Balloonbush; Leaves; antiinflammitory; 2 5 6
Beardtongue; Leaves; emetic; 2 3
Solanaceae
Chinese Lantern; Root/Tuber; Grippe; 9
Chinese Thorn-apple; Root/Tuber; many; 2 3 8
Desert Tobacco; Leaves; smoked; 6 8
Nightshade; Leaves; unspecified; 5 6 9
Typhaceae
Broadleaf Cattail; Pollen; Many; 8
Zygophyllaceae
Creosote Bush; Leaves; many; 6
Puncturevine; Leaves; unspecified; 6 9

Table 4. Winter Plant Availability: Major Use by Plant Family, Common Name, Plant Part, Specific Use, and Ecoregion

Artifacts

Agavaceae
Banana Yucca; Root/Tuber; Soap; 4 7
Banana Yucca; Stalk; Artifacts; 4 7
Banana Yucca; Thorn; sewing; 4 7
Parry's Agave; Thorn; Sewing; 4
Torrey's Yucca; Root/Tuber; Soap; 4 6
Anacardiaceae
Skunkbush Sumac; Bark; Baskets; 7
Skunkbush Sumac; Stem; Baskets; 7
Sumac; Wood; Artifacts;
Asclepiadaceae
Spider Milkweed; Fiber; Strings; 5 6
Asteraceae
Sunflower; stalk; Artifacts; 8 9
Bignoniaceae
Desert Willow; Wood; many; 8
Cactaceae
Nipple Beehive Cactus; Thorn; Weapon; 6
Chenopodiaceae
Fourwing Saltbush; Root/Tuber; Soap; 1 4 7 8 9
Cupressaceae
Juniper; Branches; Artifacts; 7
Juniper; Wood; Artifacts; 7
Fabaceae
Honey Mesquite; Root/Tuber; Cradle Board, baskets; 4 5 6 8 9
Slimflower Scurfpea; Stem; garlands; 2 3
Fagaceae
Gambel Oak; Leaves; mattress; 7
Gambel Oak; Wood; many; 7
Oak; Branches; Artifacts; 7
Oak; Wood; Artifacts; 7
Fouqueriaceae
Ocotillo; Branches; Shelter; 6
Ocotillo; stem; Many; 6
Ocotillo; Thorn; ear piercing; 6
Liliaceae
Beargrass; Leaves; Baskets; 4
Sacahuista; Fiber; many; 4
Moraceae
Osage Orange; Wood; many; 9
Pinaceae
Ponderosa Pine; Wood; many; 7
Southwestern White Pine; Wood; many; 7
Twoneedle Pinyon; Branches; Artifacts; 7
Twoneedle Pinyon; Leaves; Artifacts; 7
Twoneedle Pinyon; Wood; Artifacts; 7
Poaceae
Blue Grama; Stem; Brushes and Brooms; 1 4 7
Little Bluestem; Fiber; insulation; 1 3 7
Rosaceae
Apache Plume; Fiber; Padding; 7
Apache Plume; Wood; Cradle Board, baskets; 7
Black Cherry; Stem; Arrow Shafts; 7
Salicaceae
Rio Grande Cottonwood; Wood; many; 8
Willow; Bark; Baskets; 8

Willow; Stem; Arrow Shafts; 8
Willow; Stem; Baskets; 8
Willow; Stem; Switch for disciplining children; 8
Sapindaceae
Western Soapberry; Root/Tuber; Soap; 2 3 8 9
Western Soapberry; Wood; many; 2 3 8 9
Typhaceae
Broadleaf Cattail; Leaves; Rugs; 8
Ulmaceae
Hackberry; Wood; Artifacts; 3 8 9

Cooking

Liliaceae
Beargrass; Leaves; Preserving Fruit; 4
Beargrass; Leaves; Roasting Mescal; 4
Poaceae
Alkali Sacaton; Leaves; Steam Cooking; 8
Spike Muhly; Leaves; Steam Cooking; 4 7

Dye

Berberidaceae
Red Barberry; Root/Tuber; Yellow; 4 6 7
Krameriaceae
Littleleaf Ratany; Root/Tuber; Red; 4 5 6
Moraceae
Osage Orange; Root/Tuber; Yellow; 9
Orobanchaceae
Indian Paintbrush; Root/Tuber; Black; 7
Polygonaceae
Annual Buckwheat; Leaves; Brown; 2 3

Food

Agavaceae
Banana Yucca; Fruit/Pods; Bread & Cake; 4 7
Banana Yucca; Fruit/Pods; Food; 4 7
Banana Yucca; Root/Tuber; Food; 4 7
Torrey's Yucca; Seeds; Bread & Cake; 4 6
Amaranthaceae
Redroot Amaranth; Leaves; Food; 4 8 9
Redroot Amaranth; Seeds; Bread & Cake; 4 8 9
Asclepiadaceae
Spider Milkweed; Stem; gum; 5 6
Asteraceae
Louisiana Sagewort; Leaves; beverage; 7
Louisiana Sagewort; Stem; beverage; 7
Boraginaceae
Heliotrope; Seeds; Food; 3
Brassicaceae
Herb Sophia; Leaves; Food; 5 9
Cactaceae
Christmas Cactus; Fruit/Pods; food; 4 7
Chenopodiaceae
Fourwing Saltbush; Leaves; Food; 1 4 7 8 9
Fourwing Saltbush; Seeds; Food; 1 4 7 8 9
Goosefoot; Leaves; Food; 4 7 8 9
Lambsquarters; Leaves; Food; 4 7 8 9
Pitseed Goosefoot; Leaves; Food; 4 7 8 9
Commelinaceae
Whitemouth dayflower; Root/Tuber; Food; 2 3
Cucurbitaceae
Missouri Gourd; Root/Tuber; Food; 1 4 5 7 9
Missouri Gourd; Seeds; Food; 1 4 5 7 9
Cupressaceae
Alligator Juniper; Fruit/Pods; Food; 7
Juniper; Leaves; Food; 7
Oneseed Juniper; Fruit/Pods; Food; 7
Oneseed Juniper; Root/Tuber; Food; 7
Pinchot's Juniper; Fruit/Pods; Food; 4 7
Cyperaceae
Yellow Nutsedge; Root/Tuber; Food; 3 8
Fabaceae
Catclaw Acacia; Seeds; Food; 6
Honey Mesquite; Fruit/Pods; Food; 4 5 6 8 9
Honey Mesquite; Seeds; Bread & Cake; 4 5 6 8 9
Indian Rushpea; Root/Tuber; Food; 1 4 5 6 9
Purple Prairie Clover; Root/Tuber; Food; 1
Whitethorn Acacia; Seeds; Food; 6
Fagaceae
Gambel Oak; Seeds; Food; 7
Oak; Bark; Food; 7
Oak; Nuts; Food; 7
Juncaceae
Arctic Rush; Root/Tuber; Food; 8
Loasaceae
Blazingstar; Seeds; Food; 1 4 5 6 9
Malvaceae
Globemallow; Root/Tuber; Food; 1 4 5 6 7 9
Nyctaginaceae
Snowball Sand Verbena; Root/Tuber; Food; 3
Onagraceae
Whitest Eveningprimrose; Leaves; Food; 5 6 9
Whitest Eveningprimrose; Seeds; Food; 5 6 9
Pedaliaceae
Louisiana Ram's Horn; Seeds; Food; 2 3 6
Poaceae
Needlegrass; Seeds; Food; 1 4
Obtuse Panicgrass; Seeds; Food; 8
Polygonaceae
Canaigre Dock; Leaves; Food; 3 5
Pteridaceae
Rock Weed; Leaves; beverage; 4 7
Rhamnaceae
Lotebush; Fruit/Pods; Food; 4 6
Rosaceae
Wild Rose; Fruit/Pods; Food; 7 8 9
Woods' Rose; Fruit/Pods; Food; 7 8 9
Salicaceae
Rio Grande Cottonwood; Bark; Vitamin C; 8
Willow; Leaves; Food; 8
Typhaceae
Broadleaf Cattail; Seeds; Food; 8

Fuel

Cupressaceae
Alligator Juniper; Wood; fuel; 7
Juniper; Wood; fuel; 7
Pinchot's Juniper; Wood; fuel; 4 7
Ephedraceae
Torrey's Jointfir; Wood; fuel; 4 6
Fabaceae
Catclaw Acacia; Wood; fuel; 6
Featherplume; Wood; fuel; 1 6
Honey Mesquite; Wood; fuel; 4 5 6 8 9
Whitethorn Acacia; Wood; fuel; 6
Fagaceae
Oak; Wood; fuel; 7
Fouquieriaceae
Ocotillo; stem; fuel; 6
Ocotillo; Wood; fuel; 6
Pinaceae
Southwestern White Pine; Wood; fuel; 7
Twoneedle Pinyon; Wood; fuel; 7

Rosaceae
Woods' Rose; Wood; fuel; 7 8 9

Medicine

Amaranthaceae
Redroot Amaranth; Leaves; many; 4 8 9
Anacardiaceae
Littleleaf Sumac; Wood; not specified; 8
Asteraceae
Broom Snakeweed; Stem; Unspecified; 1 2 4 5 6 7 8 9
Cocklebur; Root/Tuber; blood medicine; 8
Desert Holly; Leaves; tea for broken bones; 4 5 6
Dotted Gayfeather; Root/Tuber; urinary aid; 1
Hopi Tea Greenthread; Stem; tea; 6 8 9
Louisiana Sagewort; Leaves; many; 7
Louisiana Sagewort; Leaves; smudge; 7
Prairie Sagewort; Leaves; smoking with tobacco; 4 7
Prairie Sagewort; Leaves; smudge; 4 7
Sand Sagebrush; Leaves; many; 2 3
Sunflower; stalk; Medicine; 8 9
Threadleaf Ragwort; Leaves; many; 2 4 6
Berberidaceae
Red Barberry; Root/Tuber; Medicine; 4 6 7
Brassicaceae
Herb Sophia; Leaves; toothache; 5 9
Cactaceae
Christmas Cactus; Fruit/Pods; narcotic; 4 7
Chenopodiaceae
Fourwing Saltbush; Leaves; many; 1 4 7 8 9
Fourwing Saltbush; Root/Tuber; many; 1 4 7 8 9
Cucurbitaceae
Missouri Gourd; Seeds; Drug; 1 4 5 7 9
Cupressaceae
Juniper; Branches; Medicine; 7
Juniper; Leaves; Drug; 7
Juniper; Leaves; Medicine; 7
Oneseed Juniper; Fruit/Pods; Diuretic; 7
Oneseed Juniper; Leaves; digestion; 7
Oneseed Juniper; Root/Tuber; energy drink for infants; 7
Oneseed Juniper; Wood; ceremonial fires; 7
Equisetaceae
Scouring Rush; Stem; many; 8
Euphorbiaceae
Sandmat; Stem; many; 2 3 5
Fabaceae
Honey Mesquite; Fruit/Pods; earache; 4 5 6 8 9
Honey Mesquite; Fruit/Pods; Medicine; 4 5 6 8 9
Honey Mesquite; Leaves; antifungal; 4 5 6 8 9
Honey Mesquite; Leaves; Medicine; 4 5 6 8 9
Fagaceae
Gambel Oak; Seeds; Potency aid; 7
Fouquieriaceae
Ocotillo; Leaves; many; 6
Krameriaceae
Littleleaf Ratany; Root/Tuber; wound care; 4 5 6
Lamiaceae
Drummond's Skullcap; Root/Tuber; many; 4
Liliaceae
Beargrass; Leaves; Insect-repellant; 4
Loasaceae
Blazingstar; Leaves; Diuretic; 1 4 5 6 9
Moraceae
Osage Orange; Root/Tuber; eye wash; 9
Nyctaginaceae
Snowball Sand Verbena; Root/Tuber; many; 3
Onagraceae
Whitest Eveningprimrose; Leaves; many; 5 6 9
Pedaliaceae
Louisiana Ram's Horn; Fruit/Pods; Medicine; 2 3 6
Pinaceae
Southwestern White Pine; Leaves; Drug; 7
Twoneedle Pinyon; Leaves; Medicine; 7
Poaceae
Big Bluestem; Root/Tuber; many; 1 2 3
Giant Dropseed; Stem; prayer sticks; 3
Little Bluestem; Stem; sores; 1 3 7
Rosaceae
Black Cherry; Bark; Antidiarrheal; 7
Black Cherry; Bark; Burn Dressing; 7
Wild Rose; Fruit/Pods; unspecified; 7 8 9
Salicaceae
Rio Grande Cottonwood; Bark; wound care; 8
Sapindaceae
Western Soapberry; Sap; wound care; 2 3 8 9
Solanaceae
Chinese Lantern; Root/Tuber; Grippe; 9
Chinese Thorn-apple; Root/Tuber; many; 2 3 8

Appendix C

Photo Credits

Conor Flynn

Acanthaceae: *Stenandrium barbatum* on limestone (>>>)
Agavaceae*: Dasylirion*, *Yucca baccata, Yucca campestris,Yucca elata*
Amaranthaceae: *Atriplex canescens*
Anacardeaceae *Rhus microphylla*
Asclepiadaceae: *Asclepias latifolia*
Asteraceae: *Acourtia*, *Ambrosia, Baccharis, Cirsium neomexicanum, Cirsium undulatum, Dyssodia, Gutierrezia,* Haplopappus flavescens, *Helianthus ciliaris, Helianthus petiolaris*, *Melampodium leucanthum Palafoxia, Parthenium confertum, Psilostrophe, Ratibida tagetes*, *Senecio flaccidus*, *Senecio riddellii*, *Stephanomeria pauciflora, Thymophylla acerosa, Verbesina enceliodes*
Boraginaceae: *Cryptantha cinerea,* Heliotropium, *Tiquilia canescens*
Brassicaceae: *Dimorphocarpa wislizeni*, *Lepidium alysoides, Nerisyrenia, Physaria fendleri*,
Cactaceae: *Echinocactus horizonthalonius*, *Echinocactus texensis*, *Echinocereus coccineus*, *Echinocereus* reichenbachii, *Escobaria vivipara, Mammilaria, Opuntia macrocentra,*
Cucurbitaceae: *Ibervillea tenuisecta*
Cyperaceae: *Cyperus squarrosus*
Elaeagnaceae: *Elaeagnus angustifolia*
Ephedraceae: *Ephedra torreyana*
Equisetaceae: *Equisetum*
Euphobiaceae: *Euphorbia chamaesyce*, *Croton glandulosus* var. lindheimeri
Fabaceae: Astragalus mollisimus, *Dalea candida*, *Dalea formosa, Dalea jamesii, Mimosa aculeaticarpa*, *Mimosa quadrivalvis, Pomaria jamesii*, *Senna bauhinoides, Acacia greggii*
Fagaceae: *Quercus gambelii*
Fouquieriaceae: *Fouquieria splendens*
Hydrophylloideae: *Phacelia integrifolia*
Krameriaceae: *Krameria erecta*
Lamiaceae: *Monarda punctata*
Liliaceae: *Allium*
Linaceae: *Linum*
Loasaceae: *Mentzelia multicaulis*
Malvaceae: *Sphaeralcea coccinea*
Nyctaginaceae: *Abronia fragrans*
Ongraceae: *Calylophus serrulatus, Gaura coccinea, Gaura villosa Oenothera*
Papaveraceae: *Argemone*
Pinaceae: *Pinus edulis*
Plantaginaceae: *Maurandya wislizeni, Plantago patagonica*
Poaceae: *Bothriochloa, Cenchrus spinifex*, *Chloris cucullata*, *Dasyochloa pulchella*, *Eragrostis lehmanniana*, *Setaria leucopila*, *Sporobolus cryptandrus*
Polemoniaceae: *Ipomopsis pumila*
Polygonaceae: *Eriogonum abertianum*, *Rumex*
Rhamnaceae: *Condalia ericoides, Zizyphus*
Rosaceae: *Fallugia paradoxa, Prunus virginiana, Rosa woodsii*
Salicaceae: *Populus*
Sapindaceae: *Sapindus saponaria*,
Scrophulariaceae: *Penstemon ambiguus*
Solanaceae: *Chamaesaracha sordida, Nicotiana obtusifloia, Solanum elaeagnifolium, Quincula lobata*
Tamaricaceae: *Tamarix*
Ulmaceae: *Ulmus pumila*
Verbenaceae: *Glandularia, Verbena plicata*

Gene Jercinovic

Cactaceae: Mammillaria grahamii

George Miller

Amaryllidaceae: *Allium drummondii*
Asteraceae: *Liatris punctata*
Martyniaceae: *Proboscidea louisianica*
Polygonaceae: *Eriogonum annuum*
Poaceae: *Zea mays*,

Gregg Mastropietro

Landscapes near bottomless lakes, CFO District (3 photos) (>>>).

Lisa Mandelkern

Cactaceae: *Mammillaria grahamii*
Fabaceae: *Sophora secundiflora*

Max Licher

Amaranthaceae: *Amaranthus albus*
Anacardiaceae *Rhus trilobata*
Asteraceae: *Helianthus annuus, Acourtia nana*
Cyperaceae: *Cyperus esculentus*
Cupressaceae: *Juniperus monosperma*
Euphorbiaceae: *Chamaesyce glyptosperma*
Fabaceae: *Psoralidium tenuiflorum*
Fagaceae: *Quercus gambelii, Quercus havardii*
Juglandaceae: *Juglans major*
Pinaceae: *Pinus edulis*
Poaceae: *Achnatherum hymenoides, Hilaria mutica, Phragmites australis, Cenchrus spinifex*
Portulacaceae: *Portulaca oleracea*
Scrophulariaceae *Castilleja integra*
Typhaceae: *Typha latifolia*
Vitaceae *Vitis arizonica*

Martin Stein

Agavaceae : Agave harvesting

Patrick Alexander

Agavaceae: *Agave lechugilla*, *Agave parryi, Nolina microcarpa*, *Yucca elata*, *Yucca baccata*, *Yucca torreyi*
Amaranthaceae: *Amaranthus retroflex* (3 photos), *Atriplex canescens*, *Chenopodium sp.*
Anacardiaceae: *Rhus micropylla, Rhus trilobata*
Apocynaceae: *Sarcostemma, Asclepias asperula*
Asteraceae: *Artemisia carruthii*, *Artemisia ludoviciana*, *Cirsium neomexicanum*, *Cirsium ochrocentrum*, *Dyssodia papposa*, *Flourensia cernua*, *Gutierrezia microcephala*, *Gutierrezia sarothrae*, *Helianthus annus*, *Helianthus ciliaris*, *Helianthus petiolaris*, Laennecia coulteri, *Liatris punctata*, *Melampodium leucanthum*, *Parthenium confertum*, *Psilostrophe tagetina*, *Thelesperma megapotamicum*, *Thymophylla acerosa Verbesina enceliodes, Xanthium strumarium*, *Zinnia grandiflora*
Bignoniaceae: *Chilopsis linearis*
Boraginaceae: *Tiquilia canescens*, *Cryptantha cinerea*, *Heliotropium convolvulaceum*
Brassicaceae: *Capsella bursa-pastoris*, *Descurainia sophia*, Dimorphocarpa wislizeni, *Lepidium montanum*, *Physaria fendleri*
Cactaceae: *Coryphantha macromeris*, *Cylindropuntia imbricata*, *Cylindropuntia leptocaulis*, *Echinocactus texensis*, *Echinocereus coccineus Echinocereus reichenbachii*, *Mammillaria grahamii*, *Opuntia macrocentra*
Cannabaceae: *Celtis reticulata*
Commelinaceae: *Commelina erecta*

Cucurbitaceae: *Citrullus lanatus*, *Cucurbita foetidissima*
Cupressaceae: *Juniperus deppeana, Juniperus monosperma*
Cyperaceae: *Cyperus esculentus*
Equisetaceae: *Equisetum laevigatum*
Euphorbiaceae: *Acalypha phleoides*, *Croton pottsii*, *Euphorbia davidii*
Fabaceae: *Acacia constricta*, *Astragalus mollissimus, Dalea formosa*, *Flourensia cernua*, *Hoffmannseggia glauca*, *Pomaria jamesii*, *Senna bauhinoides*, *Sophora secundiflora*, *Vicia ludoviciana*
Facaceae: Prosopis glandulosa
Fagaceae: Quercus gambelii
Fouquieriaceae *Fouquieria splendens*
Hydrophylloideae: *Phacelia popei*, *Juniperus monosperma*
Koeberliniaceae: *Koeberlinia spinosa*
Krameriaceae: *Krameria erecta*
Lamiaceae: *Hedeoma nanum*, *Marrubium vulgare*, *Monarda punctata*, *Poliomintha incana*
Lilliaceae *Nothoscordum bivalve*
Linacae: *Linum aristatum*
Malvaceae: *Sphaeralcea angustifolia*
Moraceae: *Morus microphylla*
Ongraceae: *Oenothera albicaulis*
Plantaginaceae: *Plantago patagonia*
Poaceae: *Achnatherum hymenoides, Bothriochloa barbinoides, Chloris cucullata*, *Elymus canadensis*, *Pleuraphis mutica*, *Juncus arcticus*, *Muhlenbergia porteri*, *Panicum obtusum*, *Setaria leucopila*, *Sporobolus airoides*, *Sporobolus cryptandrus*, *Poliomintha incana*, *Portulaca oleracea*
Rhamnaceae: *Condalia ericoides*
Rosaceae: *Prunus virginiana*
Scrophulariaceae *Castilleja integra*
Solanaceae: *Chamaesaracha sordida*, *Qunicula lobata*
Typhaceae: *Typha latfolia*

Russell Kleinman

AGAVACEAE *Nolina microcarpa, Yucca baccata, Yucca elata*
Anacardiceae *Rhus trilobata*
Asteraceae Artemisia filifolia, *Artemisia carruthii, Cirsium neomexicanum, Flourensia cernua*, *Gutierrezia sarothrae, Helianthus petiolaris, Helianthus ciliaris, Laennecia coulteri, Melampodium leucanthum, Parthenium confertum, Senecio flaccidus, Xanthium strumarium, Zinnia_grandiflora*
Berberiaceae *Berberis haematocarpa*
Bignoniaceae Chilopsis linearis,
Boraginaceae *Cryptantha cinerea,*
Brassicaceae *Descurainia sophia, Dimorphocarpa wislizeni, Physaria fendleri*
Cactaceae *Echinocereus fendleri, Opuntia macrocentra, Cylindropuntia leptocaulis, Opuntia macrocentra,*
Chenopodiaceae *Atriplex canescens,*
Chenopodium album, Kochia scoparia, Krascheninnikovia lanata, Kochia_scoparia, Salsola tragus, Chenopodium berlandier,
Cupressaceae Juniperus deppeana, Juniperus monosperma,
Eleagnaceae Eleagnus angustifolia,
Euphorbiaceae *Croton pottsii*
Cucurbitaceae *Cucurbita foetidissima, Euphorbia davidii,*
Fabaceae *Astragalus mollissimus, Dalea purpurea, Dalea formosa, Hoffmannseggia glauca, Psoralidium tenuiflorum, Senna bauhinioides, Vicia ludoviciana,*
Fagaceae *Quercus grisea,*
Fouquieriaceae *Fouquieria splendens*
Juglandaceae *Juglans major*,
Juncaceae *Juncus articus*
Koeberliniaceae *Koeberlinia spinosa*
Lamiaceae *Hedeoma nana, Marrubium vulgare, Mentha arvensis, Monarda punctata,*
Liliaceae Yucca baccata
Linaceae *Linum aristatum,*
Loasaceae *Cevallia sinuata, Mentzelia multiflora*
Moraceae Maclura pomifera
Onagraceae *Oenothera albicaulis,*
Pinaceae *Pinus edulis, Pinus strobiformis, Pinus ponderosa*,
Plantaginaceae *Plantago patagonica,*
Poaceae *Achnatherum hymenoides, Andropogon gerardii, Bothriochloa barbinodis, Bouteloua gracilis, Bouteloua eriopoda, Cenchrus spinifex, Elymus canadensis, Eragrostis lehmanniana, Elymus canadensis, Muhlenbergia porteri, Muhlenbergia wrightii, Muhlenbergia porterii, Panicum obtusum, Pleuraphis mutica, Schizachrium scoparium, Setaria leucopila, Sporobolus cryptandrus,*
Polygonaceae *Polygonum lapathifolia, Rumes hymenosepalus*
Portulaceae *Portulaca oleracea*
Salicaceae *Salix exigua,*
Sapindaceae Sapindus saponaria
Scrophulariaceae *Epixiphium antirrhiniflora, Penstemon ambiguous*
Solanaceae *Lycium pallidum*
Rhamnaceae *Zizyphus obtusifolia*
Rosaceae *Rosa woodsia*
Solanaceae *Nicotiana trigonophylla Datura quercifolia, Physalis hederifolia, Solanum elaeagnifolium,*
Rosaceae Prunus virginiana,
Tamaricaceae Tamarisk chinensis
Ulmaceae Ulmus pumila
Zygophyllaceae Kallstroemia parviflora, Larrea tridentata,Tribulus terrestris

Terry Gregston

Agavaceae *Agave neomexicana,* Dasylirion leiophyllum
Anacardiaceae Rhus microphylia
Asteraceae *Artemisia filifolia,* Dyssodia papposa, Helianthus annuus, Helenium microcephalum
Berberidaceae Mahonia haematocarpa
Brassicaceae Physaria fendleri
Cactaceae Echinocereus reichenbachii , Opuntia macrocentra
Commelinaceae Commelina erecta
Ephedraceae Ephedra torreyana
Euphorbiaceae Chamaesaracha sordida
Fabaceae *Acacia greggii*
Fagaceae Quercus havardii
Juncaginaceae Juncus arcticus
Lamiaceae Poliomintha incana, Scutellaria drummondii
Moraceae Maclura pomifera
Nyctaginaceae *Abronia fragrans*
Onagraceae *Calylophus serrulatus,* Gaura villosa
Papaveraceae Argemone squarrosa
Solanaceae Physalis hederifolia

Carole Ritchie

Cucurbitaceae Citrullus lanatus

Steve Hurst

Poaceae Zea mays

Hitchcock, A.S.

Poaceae Zea mays

Gettrup, Hobro

Poaceae Zea mays

Appendix D: Summary of Plant Uses

Aceraceae

***Acer glabrum* var. *neomexicanum* (Greene) Kearney & Peebles - New Mexico Maple**

Food - Sweetener - Sap collected and boiled to obtain syrup and sugar; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

***Acer negundo* L. - Boxelder**

Food - Dried Food - Inner bark scrapings dried and kept for winter use; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Food - Sweetener - Inner bark boiled until sugar crystallizes out of it; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Agavaceae

***Agave parryi* Engelm. - Parry's Agave**

Food - Bread & Cake - Leaf bases pit cooked, made into cakes, dried and used for food; Mescalero, Basehart 1974, p. 30.

Food - Unspecified - Bulbous crowns baked in pits, pulpy centers released, pounded into thin sheets and eaten; Chiricahua & Mescalero, Castetter and Opler 1936, p. 35.

Food - Unspecified - Stalks roasted, boiled or eaten raw; Chiricahua & Mescalero, Castetter and Opler 1936, p. 38.

Food - Vegetable - Stalks boiled, dried and stored to be used as vegetables; Chiricahua & Mescalero, Castetter and Opler 1936, p. 38.

***Dasylirion wheeleri* S. Wats. - Common Sotol**

Fiber - Furniture - Stalks used as cross pieces for cradleboard backs; Mescalero, Basehart 1974, p. 41.

Food - Beverage - Crowns pit-baked, removed, peeled, crushed, mixed with water, fermented and used as a beverage; Chiricahua & Mescalero, Castetter and Opler 1936, p. 52.

Food - Beverage - Pounded and used as a drink; Mescalero, Basehart 1974, p. 41.

Food - Bread & Cake - Crowns baked in pits, stripped, pounded to a pulp, spread out to dry and eaten like cake; Chiricahua & Mescalero, Castetter and Opler 1936, p. 38.

Food - Bread & Cake - Plants pit cooked, formed into cakes, dried and used for food; Mescalero, Basehart 1974, p. 41.

Food - Dried Food - Crowns baked, pounded and dried for winter use; Mescalero, Belland Castetter 1941, p. 58.

Food - Soup - Head hearts cooked with bones to make soup; Mescalero, Basehart 1974, p. 41.

Food - Unspecified - Fresh, young stalks used for food; Mescalero, Basehart 1974, p. 41.

Food - Unspecified - Stalks roasted, boiled or eaten raw; Chiricahua & Mescalero, Castetter and Opler 1936, p. 38.

Food - Vegetable - Stalks boiled, dried and stored to be used as vegetables; Chiricahua & Mescalero, Castetter and Opler 1936, p. 38.

Other - Ceremonial Items - Stalks used in the head dress of Mountain Spirit dancers; Mescalero, Basehart 1974, p. 41.

Other - Smoking Tools - Stalks and leaf base tissues used to make cigarette papers; Mescalero, Basehart 1974, p. 41.

Other - Tools - Stalks dried, split, drilled to make small holes and used as fire drill hearths; Mescalero, Basehart 1974, p. 41.

***Nolina microcarpa* S. Wats. - Sacahuista**

Fiber - Mats, Rugs & Bedding - Grass used as tipi ground covering; Mescalero, Basehart 1974, p. 51.

Food - Unspecified - Stalks roasted, boiled or eaten raw; Chiricahua & Mescalero, Castetter and Opler 1936, p. 38.

Food - Vegetable - Stalks boiled, dried and stored to be used as vegetables; Chiricahua & Mescalero, Castetter and Opler 1936, p. 38.

Other - Containers - Moist grass laid onto hot stones to prevent steam from escaping; Chiricahua & Mescalero, Castetter and Opler 1936, p. 36.

Other - Cooking Tools - Grass woven into trays and used for processing datil and mescal; Mescalero, Basehart 1974, p. 51.

***Yucca baccata* Torr. - Banana Yucca**

Fiber - Basketry - Small roots used for basket work; Mescalero, Basehart 1974, p. 33.

Fiber - Cordage - Leaves used to make twine or rope; Mescalero, Basehart 1974, p. 33.

Food - Beverage - Fruits used to make a drink; Mescalero, Basehart 1974, p. 33.

Food - Bread & Cake - Fruit pulp ground, made into large cakes and stored indefinitely; Chiricahua & Mescalero, Castetter and Opler 1936, p. 39.

Food - Bread & Cake - Fruit roasted, split, seeds removed and pulp ground into large cakes; Chiricahua & Mescalero, Castetter and Opler 1936, p. 39.

Food - Dried Food - Ripe fruits cooked, split, cleaned of seeds, dried and used for food; Mescalero, Basehart 1974, p. 33.

Food - Sauce & Relish - Fruits made into a syrup and placed on fruits before drying; Mescalero, Basehart 1974, p. 33.

Food - Soup - Leaves cooked in soups; Chiricahua & Mescalero, Castetter and Opler 1936, p. 39.

Food - Unspecified - Leaves boiled with meat; Chiricahua & Mescalero, Castetter and Opler 1936, p. 39.

Food - Vegetable - Flowers eaten if obtained before the summer rain; otherwise they taste bitter; Chiricahua & Mescalero, Castetter and Opler 1936, p. 39.

Other - Soap - Large roots used to make soap; Mescalero, Basehart 1974, p. 33.

Artifacts - Stalk - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Soap - Root/Tuber - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Food - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Green - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

***Yucca campestris* McKelvey - Plains Yucca (not covered in text).**

Soap - Root/Tuber - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Food - Flower - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Food - Stalk - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Dye - Green - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

***Yucca elata* (Engelm.) Engelm. - Soaptree Yucca**

Fiber - Basketry - Leaves woven into shallow or tray baskets to carry prepared mescal home; Chiricahua & Mescalero, Castetter and Opler 1936, p. 37.

Food - Dried Food - Flowers boiled, dried and stored for future food use; Mescalero, Basehart 1974, p. 40.

Food - Dried Food - Stems baked overnight, dried, broken into pieces, softened and eaten; Chiricahua & Mescalero, Castetter and Opler 1936, p. 38.

Food - Dried Food - Trunks pit cooked, dried and stored for future food use; Mescalero, Basehart 1974, p. 40.

Food - Soup - Flowers used as fresh vegetables in soups; Mescalero, Basehart 1974, p. 40.

Food - Staple - Trunks pit cooked, pounded and made into flour; Mescalero, Basehart 1974, p. 40.

Food - Unspecified - Young stalks cooked, peeled and eaten hot;

Mescalero, Basehart 1974, p. 40.
Food - Vegetable - Flowers boiled and eaten as a vegetable; Chiricahua & Mescalero, Castetter and Opler 1936, p. 39.

***Yucca glauca* Nutt. - Small Soapweed**
Fiber - Basketry - Leaves split and used to make baskets; Mescalero, Basehart 1974, p. 40.
Food - Unspecified - Stalks roasted, boiled or eaten raw; Chiricahua & Mescalero, Castetter and Opler 1936, p. 38.
Food - Vegetable - Stalks boiled, dried and stored to be used as vegetables; Chiricahua & Mescalero, Castetter and Opler 1936, p. 38.

***Yucca torreyi* Shafer - Torrey's Yucca**
Food - Bread & Cake - Fruit pulp ground, made into large cakes and stored indefinitely; Chiricahua & Mescalero, Castetter and Opler 1936, p. 39.
Food - Bread & Cake - Fruit roasted, split, seeds removed and pulp ground into large cakes; Chiricahua & Mescalero, Castetter and Opler 1936, p. 39.

Amaranthaceae

***Amaranthus albus* L. - Prostrate Pigweed**
Food - Bread & Cake - Seeds winnowed, ground into flour and used to make bread; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.
Food - Unspecified - Eaten without preparation or cooked with green chile and meat or animal bones; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.

***Amaranthus retroflexus* L. - Redroot Amaranth**
Food - Bread & Cake - Seeds winnowed, ground into flour and used to make bread; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.
Food - Unspecified - Leaves eaten without preparation or cooked with green chile and meat or animal bones; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.

Anacardiaceae

***Rhus glabra* L. - Smooth Sumac**
Food - Special Food - Bark eaten by children as a delicacy; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

***Rhus microphylla* Engelm. ex Gray - Littleleaf Sumac**
Food - Preserves - Dried fruits ground, pulp mixed with water and sugar and cooked to make jam; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.

***Rhus trilobata* Nutt. - Skunkbush Sumac**
Food - Dried Food - Fruits ground with mescal, dried and stored; Chiricahua & Mescalero, Castetter and Opler 1936, p. 37.
Food - Preserves - Dried fruits ground, pulp mixed with water and sugar and cooked to make jam; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.
Food - Preserves - Fruits formerly used to make jam; Chiricahua & Mescalero, Castetter and Opler 1936, p. 49.

***Rhus sp.* L. - Sumac species**
Food - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Food - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Food - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Medicine - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Artifacts - Wood - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Apiaceae

***Cymopterus acaulis* var. *fendleri* (Gray) Goodrich - Fendler's Springparsley**
Food - Spice - Leaves used with other green plant parts to flavor soups and meats; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.
Food - Unspecified - Raw roots eaten for food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.
Food - Unspecified - Roots eaten raw; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

***Ligusticum porteri* Coult. & Rose - Porter's Licoriceroot**
Food - Unspecified - Eaten without preparation or cooked with green chile and meat or animal bones; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.

Asclepiadaceae

***Asclepias speciosa* Torr. - Showy Milkweed**
Food - Candy - Milk squeezed from leaves and stems and chewed as gum; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

***Matelea producta* (Torr.) Woods. - Texas Milkvine**
Food - Unspecified - Seeds eaten fresh or boiled; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

Asteraceae

***Artemisia dracunculus* L. - Wormwood**
Food - Beverage - Leaves and young stems boiled to make a non-intoxicating beverage; Chiricahua & Mescalero, Castetter and Opler 1936, p. 53.

***Artemisia ludoviciana* Nutt. - Louisiana Sagewort**
Food - Spice - Sage used to flavor meats; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

***Artemisia* sp. - Sage**
Other - Ceremonial Items - Plant used in ceremonial contexts; Chiricahua & Mescalero, Castetter and Opler 1936, p. 24.

***Cirsium pallidum* Woot. & Standl. - Pale Thistle**
Food - Bread & Cake - Seeds threshed, winnowed, ground and the flour used to make bread; Chiricahua & Mescalero, Castetter and Opler 1936, p. 49.
Food - Unspecified - Seeds boiled and eaten; Chiricahua & Mescalero, Castetter and Opler 1936, p. 49.

***Dyssodia papposa* (Vent.) A.S. Hitchc. - Fetid Marigold**
Food - Bread & Cake - Seeds winnowed, dried, stored, ground into flour and used to make bread; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.
Food - Unspecified - Seeds roasted without grinding and combined with other foods; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.
Food - Vegetable - Tops cooked alone or with meat and used as greens; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

***Gutierrezia* sp. - Snakeweed**
Other - Ceremonial Items - Plant used in ceremonial contexts; Chiricahua & Mescalero, Castetter and Opler 1936, p. 24.

***Helianthus annuus* L. - Common Sunflower**
Food - Bread & Cake - Seeds ground, sifted, made into dough and baked on hot stones; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.
Food - Sauce & Relish - Seeds ground into flour and used to make a thick gravy; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.

***Helianthus sp.* L. – Sunflower species**
Food - Seeds - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Medicine - Sap - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Artifacts - stalk - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Medicine - stalk - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

***Parthenium incanum* Kunth - Mariola**
Food - Beverage - Fresh leaves boiled and used similarly to

coffee; Chiricahua & Mescalero, Castetter and Opler 1936, p. 53.

Taraxacum officinale **G.H. Weber ex Wiggers - Common Dandelion**

Food - Spice - Flower used to flavor drinks and make them stronger; Chiricahua & Mescalero, Castetter and Opler 1936, p. 51.

Thelesperma megapotamicum **(Spreng.) Kuntze - Hopi Tea Greenthread**

Food - Beverage - Fresh or stored portions boiled in water and liquid consumed with or without sugar; Chiricahua & Mescalero, Castetter and Opler 1936, p. 53.

Food - Beverage - Leaves and young stems boiled to make a non-intoxicating beverage; Chiricahua & Mescalero, Castetter and Opler 1936, p. 53.

Berberidaceae

Mahonia haematocarpa **(Woot.) Fedde - Red Barberry**

Drug - Eye Medicine - Inner wood shavings soaked in water and used as an eyewash; Mescalero, Basehart 1974, p. 49.

Dye - Yellow - Root shavings used to make a yellow dye for hides; Mescalero, Basehart 1974, p. 49.

Food - Fruit - Berries eaten fresh; Mescalero, Basehart 1974, p. 49.

Food - Preserves - Fruit cooked with a sweet substance, strained and eaten as jelly; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.

Medicine - Root/Tuber - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Dye - Yellow - Root/Tuber - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Medicine - Drug - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Food - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Brassicaceae

Camelina microcarpa **DC. - Littlepod Falsefla**

Food - Bread & Cake - Seeds threshed, winnowed, ground and the flour used to make bread; Chiricahua & Mescalero, Castetter and Opler 1936, p. 49.

Food - Unspecified - Seeds boiled and eaten; Chiricahua & Mescalero, Castetter and Opler 1936, p. 49.

Capsella bursa-pastoris **(L.) Medik. - Shepherd's Purse**

Food - Bread & Cake - Seeds winnowed, dried, stored, ground into flour and used to make bread; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.

Food - Unspecified - Seeds roasted without grinding and combined with other foods; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.

Food - Vegetable - Tops cooked alone or with meat and used as greens; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

Descurainia incana **ssp.** ***incisa*** **(Engelm.) Kartesz & Gandhi - Mountain Tansymustard**

Food - Bread & Cake - Seeds threshed, winnowed, ground and the flour used to make bread; Chiricahua & Mescalero, Castetter and Opler 1936, p. 49.

Food - Unspecified - Seeds boiled and eaten; Chiricahua & Mescalero, Castetter and Opler 1936, p. 49.

Cactaceae

Carnegia gigantea **(Engelm.) Britt. & Rose - Saguaro**

Food - Fruit - Fruit used for food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 40.

Food - Substitution Food - Syrup used in the absence of sugar to sweeten an intoxicating drink; Chiricahua & Mescalero, Castetter and Opler 1936, p. 50.

Echinocereus coccineus **Engelm. - Scarlet Hedgehog Cactus**

Food - Fruit - Raw fruit used for food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Echinocereus engelmannii **var.** ***chrysocentrus*** **(Engelm. & Bigelow) Rumpl. - Saints Cactus**

Food - Fruit - Raw fruit used for food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Echinocereus fendleri **(Engelm.) F. Seitz - Pinkflower Hedgehog Cactus**

Food - Fruit - Raw fruit used for food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Echinocereus polyacanthus **Engelm. - Mojave Mound Cactus**

Food - Fruit - Raw fruit used for food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Echinocereus rigidissimus **(Engelm.) Haage f. - Rainbow Hedgehog Cactus**

Food - Fruit - Raw fruit used for food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Echinocereus **sp. - Cactus**

Food - Fruit - Fruits eaten for food; Mescalero, Basehart 1974, p. 45.

Mammillaria grahamii **Engelm. - Graham's Nipple Cactus**

Food - Dried Food - Dried fruit cooked and eaten; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Food - Fruit - Raw fruit used for food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Mammillaria mainiae **K. Brandeg. - Counterclockwise Nipple Cactus**

Food - Fruit - Raw fruit used for food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Opuntia leptocaulis **DC. - Christmas Cactus**

Drug - Narcotic - Fruits crushed and mixed with a beverage to produce narcotic effects; Chiricahua & Mescalero, Castetter and Opler 1936, p. 55.

Opuntia **sp. - Prickly Pear**

Drug - Dermatological Aid - Stems scorched, split and used for infections and cuts; Mescalero, Basehart 1974, p. 38.

Drug - Disinfectant - Stems scorched, split and used for infections and cuts; Mescalero, Basehart 1974, p. 38.

Drug - Eye Medicine - Needles used for scraping infected eyelids and tattoos; Mescalero, Basehart 1974, p. 38.

Drug - Eye Medicine - Needles used for scraping infected eyelids; Mescalero, Basehart 1974, p. 38.

Food - Dried Food - Unpeeled fruits split, covered with juice, sun dried and stored for future food use; Mescalero, Basehart 1974, p. 38.

Food - Fruit - Tunas eaten fresh; Mescalero, Basehart 1974, p. 38.

Medicine - Drug - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Stenocereus thurberi **(Engelm.) Buxbaum - Organpipe Cactus**

Food - Fruit - Fruit used for food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 40.

Cannabaceae

Humulus lupulus **var.** ***neomexicanus*** **A. Nels. & Cockerell - Common Hop**

Food - Spice - Flower used to flavor drinks and make them stronger; Chiricahua & Mescalero, Castetter and Opler 1936, p. 51.

Food - Spice - Hops boiled and used to flavor wheat flour and potatoes; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

Caprifoliaceae

Sambucus racemosa **var.** ***racemosa*** **- European Red Elderberry**

Food - Preserves - Fruit cooked with a sweet substance, strained and eaten as jelly; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.

Chenopodiaceae

***Chenopodium album* L. - Lambsquarters**

Food - Unspecified - Eaten without preparation or cooked with green chile and meat or animal bones; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.

***Chenopodium sp.* L. - Lambsquarters species**

Food - Seeds - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Food - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Cucurbitaceae

***Cucurbita foetidissima* Kunth - Missouri Gourd**

Medicine - Drug - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Medicine - Drug - Seeds - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Cupressaceae

***Juniperus deppeana* Steud. - Alligator Juniper**

Food - Fruit - Raw fruit eaten fresh; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

Food - Preserves - Berries boiled and made into jelly or preserves; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

Food - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

***Juniperus pinchotii* - Sudw. Pinchot's Juniper (not covered in text)**

Food - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

***Juniperus monosperma* (Engelm.) Sarg. - Oneseed Juniper**

Food - Sauce & Relish - Fruit roasted, water added and the mixture made into a gravy; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

Food - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

***Juniperus scopulorum* Sarg. - Rocky Mountain Juniper**

Food - Fruit - Berries mixed with mescal and eaten; Chiricahua & Mescalero, Castetter and Opler 1936, p. 37.

***Juniperus* sp. - Juniper**

Fiber - Building Material - Used for tipi poles; Mescalero, Basehart 1974, p. 43.

Food - Fruit - Berries boiled, ground or mashed and used with other foods; Mescalero, Basehart 1974, p. 43.

Other - Fuel - Bark used as tinder for fire drills; Mescalero, Basehart 1974, p. 43.

Other - Hunting & Fishing Item - Used to make bows; Mescalero, Basehart 1974, p. 43.

Other - Tools - Used to make handles for scrapers; Mescalero, Basehart 1974, p. 43.

Other - Fuel - Wood used to heat cooking stones; Chiricahua & Mescalero, Castetter and Opler 1936, p. 36.

Food - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Artifacts - Branches - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Artifacts - Wood - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Medicine - Drug - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

fuel - Wood - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Food - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Medicine - Branches - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Cyperaceae

***Cyperus fendlerianus* Boeckl. - Fendler's Flatsedge**

Food - Fodder - Flowers salted and fed to horses; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

Food - Fodder - Seeds salted and fed to horses; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

Food - Unspecified - Tubers eaten raw or peeled and cooked; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

Fabaceae

***Hoffmannseggia glauca* (Ortega) Eifert - Indian Rushpea**

Food - Unspecified - Roots eaten either raw or cooked; Chiricahua & Mescalero, Castetter and Opler 1936, p. 42.

***Lathyrus lanszwertii* var. *leucanthus* (Rydb.) Dorn - Aspen Peavine**

Food - Dried Food - Ripe pods dried, stored and soaked and boiled when needed; Chiricahua & Mescalero, Castetter and Opler 1936, p. 49.

Food - Unspecified - Ripe pods cooked and eaten; Chiricahua & Mescalero, Castetter and Opler 1936, p. 49.

***Prosopis glandulosa* Torr. - Honey Mesquite**

Drug - Eye Medicine - Juice from leaves used for irritated eye lids; Mescalero, Basehart 1974, p. 37.

Drug - Pediatric Aid - Infusion of bark used for children with enuresis; Mescalero, Basehart 1974, p. 37.

Drug - Urinary Aid - Infusion of bark used for children with enuresis; Mescalero, Basehart 1974, p. 37.

Food - Beverage - Beans boiled, strained and used as a drink; Mescalero, Basehart 1974, p. 37.

Food - Beverage - Cooked pods and seeds ground, water added, mixture allowed to ferment and used as a beverage; Chiricahua & Mescalero, Castetter and Opler 1936, p. 53.

Food - Bread & Cake - Bean flour made into pancakes and bread; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Food - Pie & Pudding - Pods boiled in water, taken out, mashed, boiled again and eaten as pudding; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Food - Spice - Root used to flavor drinks and make them stronger; Chiricahua & Mescalero, Castetter and Opler 1936, p. 51.

Food - Staple - Beans ground into flour, mixed with other plant foods and eaten; Mescalero, Basehart 1974, p. 37.

Food - Substitution Food - Flour used in the absence of sugar to sweeten an intoxicating drink; Chiricahua & Mescalero, Castetter and Opler 1936, p. 50.

Food - Unspecified - Beans cooked with meat and seed coats spit out when eaten; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Other - Hunting & Fishing Item - Resin used for fletching arrows; Mescalero, Basehart 1974, p. 37.

Food - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Medicine - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Fuel - Wood - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

***Prosopis pubescens* Benth. - Screwbean Mesquite**

Drug - Ear Medicine - Pods soaked in water and used for earache; Mescalero, Basehart 1974, p. 44.

Food - Beverage - Fruit ground and sugar added to make a thick drink; Chiricahua & Mescalero, Castetter and Opler 1936, p. 53.

Food - Bread & Cake - Pods dried, washed, ground into flour and made into bread; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Food - Dried Food - Fruits gathered, dried and stored in sacks; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Food - Special Food - Raw pods chewed and eaten as a delicacy; Chiricahua & Mescalero, Castetter and Opler 1936, p. 41.

Robinia neomexicana **Gray - New Mexico Locust**

Food - Dried Food - Flowers boiled, dried and stored for winter food use; Mescalero, Basehart 1974, p. 47.
Food - Unspecified - Fresh flowers cooked with meat or bones and used for food; Mescalero, Basehart 1974, p. 47.
Food - Vegetable - Raw pods eaten as food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 42.
Food - Winter Use Food - Pods cooked and stored; Chiricahua & Mescalero, Castetter and Opler 1936, p. 42.
Other - Hunting & Fishing Item - Wood used to make high quality bows; Mescalero, Basehart 1974, p. 47.

Vicia melilotoides **- Vetch**

Food - Dried Food - Ripe pods dried, stored and soaked and boiled when needed; Chiricahua & Mescalero, Castetter and Opler 1936, p. 49.
Food - Unspecified - Ripe pods cooked and eaten; Chiricahua & Mescalero, Castetter and Opler 1936, p. 49.

Fagaceae

Quercus gambelii Nutt. - Gambel's Oak

Food - Fruit - Raw fruit used for food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 42.
Food - Winter Use Food - Acorns roasted slightly, pounded, mixed with dried meat and stored away in hide containers; Chiricahua & Mescalero, Castetter and Opler 1936, p. 42.

Quercus grisea **Liebm. - Gray Oak**

Food - Fruit - Raw fruit used for food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 42.
Food - Spice - Shaved root chips used to flavor drinks; Chiricahua & Mescalero, Castetter and Opler 1936, p. 51.
Food - Winter Use Food - Ripe acorns roasted slightly, pounded and mixed with dried meat and stored; Chiricahua & Mescalero, Castetter and Opler 1936, p. 42.

Quercus **sp. - Oak**

Fiber - Building Material - Used for poles in dome shaped lodges and as tipi stakes; Mescalero, Basehart 1974, p. 41.
Fiber - Furniture - Used as footrests for cradleboards; Mescalero, Basehart 1974, p. 41.
Food - Unspecified - Acorns boiled, pounded and mixed with mescal; Mescalero, Basehart 1974, p. 41.
Food - Unspecified - Acorns eaten raw; Mescalero, Basehart 1974, p. 41.
Other - Cooking Tools - Used to make platters and shelves for mescal cakes; Mescalero, Basehart 1974, p. 41.
Other - Fuel - Wood used on fire to heat cooking stones; Chiricahua & Mescalero, Castetter and Opler 1936, p. 36.
Other - Stable Gear - Used to make stirrups; Mescalero, Basehart 1974, p. 41.
Other - Tools - Used to make digging sticks and wooden tweezers; Mescalero, Basehart 1974, p. 41.
Other - Toys & Games - Used to make toy bows; Mescalero, Basehart 1974, p. 41.
Artifacts - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Medicine - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Food - Bark - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Artifacts - Branches - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Medicine - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Artifacts - Wood - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Fuel - Wood - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Food - Nuts - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Quercus **sp. - Oak Branches**

Other - Tools - Branches used to dig out crowns of the mescal plants; Chiricahua & Mescalero, Castetter and Opler 1936, p. 35.

Fouqueriaceae

Fouquieria splendens - Engelm. Ocotillo

Artifacts - Shelter - Branches - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Grossulariaceae

Ribes leptanthum **Gray - Trumpet Gooseberry**

Food - Bread & Cake - Fruit made into cakes for use during winter; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.
Food - Fruit - Raw fruit eaten fresh; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Ribes mescalerium **Coville - Mescalero Currant**

Food - Fruit - Raw fruit eaten without preparation; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Ribes pinetorum **Greene - Orange Gooseberry**

Food - Bread & Cake - Fruit ground and compressed into cakes for winter use; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Ribes wolfii **Rothrock - Wolf's Currant**

Food - Bread & Cake - Fruit ground, dried and pressed into cakes for storage; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.
Food - Fruit - Raw fruit eaten without preparation; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.
Food - Preserves - Fruit used to make jelly; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Hydrangeaceae

Jamesia americana **Torr. & Gray - Cliffbush**

Food - Unspecified - Seeds occasionally eaten fresh; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

Juglandaceae

Juglans major **(Torr.) Heller - Arizona Walnut**

Fiber - Building Material - Trees used to construct dome shaped lodges when away from home; Mescalero, Basehart 1974, p. 46.
Food - Unspecified - Nut meats eaten raw; Chiricahua & Mescalero, Castetter and Opler 1936, p. 42.
Food - Unspecified - Nut meats mixed with mescal, datil, sotol or mesquite and used for food; Mescalero, Basehart 1974, p. 46.
Food - Winter Use Food - Nut meats mixed with mesquite gravy or ground with roasted mescal and stored; Chiricahua & Mescalero, Castetter and Opler 1936, p. 42.
Other - Paint - Outer shell coverings soaked in water to make a black paint; Mescalero, Basehart 1974, p. 46.
Dye - Brown - Bark - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Food - Nuts - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Lamiaceae

Dracocephalum parviflorum **Nutt. - American Dragonhead**

Food - Spice - Leaves used as flavoring; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

Hedeoma nana **(Torr.) Briq. - Falsepennyroyal**

Food - Beverage - Leaves and young stems boiled to make a non-intoxicating beverage; Chiricahua & Mescalero, Castetter and Opler 1936, p. 53.
Food - Spice - Leaves used as flavoring; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

Mentha arvensis **L. - Canadian Mint**

Food - Spice - Leaves used as flavoring; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

***Monarda fistulosa* ssp. *fistulosa* var. *menthifolia* (Graham) Fern. - Mintleaf Beebalm**

Food - Beverage - Leaves and young stems boiled to make a non -intoxicating beverage; Chiricahua & Mescalero, Castetter and Opler 1936, p. 53.

Food - Spice - Leaves used as flavoring; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

Liliaceae

***Allium cernuum* Roth - Nodding Onion**

Food - Spice - Onions used to flavor soups and gravies; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

Food - Vegetable - Onions occasionally eaten raw; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

***Allium geyeri* S. Wats. - Geyer's Onion**

Food - Spice - Onions used to flavor soups and gravies; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

Food - Vegetable - Onions occasionally eaten raw; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

Allium sp.— Wild Onion species

Food - Root/Tuber - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Moraceae

***Broussonetia papyrifera* (L.) L'H?r. ex Vent. - Paper Mulberry**

Drug - Narcotic - Plant used as a narcotic; Chiricahua & Mescalero, Castetter and Opler 1936, p. 54.

Other - Ceremonial Items - Seeds worn around the neck in a string during ceremonies; Chiricahua & Mescalero, Castetter and Opler 1936, p. 54.

***Morus microphylla* Buckl. - Texas Mulberry**

Food - Bread & Cake - Fruit pressed into pulpy cakes, dried and stored; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Food - Fruit - Berries eaten fresh; Mescalero, Basehart 1974, p. 47.

Food - Fruit - Fruits eaten fresh; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Food - Sauce & Relish - Berries dried and used as a spread on mescal; Mescalero, Basehart 1974, p. 47.

Food - Winter Use Food - Fruit pressed into pulpy cakes, dried and stored for winter use; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Other - Weapon - Wood used to make the best war bows; Mescalero, Basehart 1974, p. 47.

Food - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Artifacts - Wood - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Oleaceae

***Forestiera pubescens* var. *pubescens* - Stretchberry**

Food - Fruit - Raw fruits occasionally eaten as food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Onagraceae

***Calylophus lavandulifolius* (Torr. & Gray) Raven - Lavenderleaf Sundrops**

Food - Unspecified - Pods cooked and eaten by children; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

***Oenothera albicaulis* Pursh - Whitest Eveningprimrose**

Food - Sauce & Relish - Seeds ground and made into a gravy; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

Food - Soup - Seeds boiled in soups; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

Food - Special Food - Fruit chewed as a delicacy without preparation; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

Oxalidaceae

***Oxalis violacea* L. - Violet Woodsorrel**

Food - Unspecified - Bulbs eaten raw or boiled; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

Food - Unspecified - Mixed with other leaves and cooked or eaten raw; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.

Pedaliaceae

***Proboscidea louisianica* ssp. *louisianica* - Louisiana Ram's Horn**

Food - Unspecified - Seeds eaten by prisoners of war in Oklahoma; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

Medicine - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Pinaceae

***Pinus edulis* Engelm. - Twoneedle Pinyon**

Drug - Cold Remedy - Needles burned and smoke inhaled for colds; Mescalero, Basehart 1974, p. 35.

Fiber - Furniture - Young trees used for the main hoop of infant cradleboards; Mescalero, Basehart 1974, p. 35.

Food - Dried Food - Nuts parched, ground, mixed with datil fruit, mescal, mesquite beans or sotol and used for food; Mescalero, Basehart 1974, p. 35.

Food - Pie & Pudding - Seeds mixed with yucca fruit pulp to make a pudding; Chiricahua & Mescalero, Castetter and Opler 1936, p. 43.

Food - Special Food - Nuts used as an essential food during girls' puberty ceremonies; Mescalero, Basehart 1974, p. 35.

Food - Special Food - Seeds ground, rolled into balls and eaten as a delicacy; Chiricahua & Mescalero, Castetter and Opler 1936, p. 43.

Food - Unspecified - Secretion from the trunk chewed; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

Other - Ceremonial Items - Pollen used instead of cattail pollen in ceremonies; Mescalero, Basehart 1974, p. 35.

Other - Waterproofing Agent - Resin used for waterproofing woven water jugs; Mescalero, Basehart 1974, p. 35.

Food - Nuts - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Artifacts - Branches - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Cermony - Pollen - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Artifacts - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Artifacts - Wood - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Medicine - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Fuel - Wood - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

***Pinus flexilis* James - Limber Pine**

Food - Unspecified - Seeds roasted and hulled or sometimes the seeds ground, shell and all and eaten; Chiricahua & Mescalero, Castetter and Opler 1936, p. 43.

***Pinus ponderosa* var. *scopulorum* Engelm. - Ponderosa Pine**

Food - Bread & Cake - Inner bark scraped off and baked in the form of cakes; Chiricahua & Mescalero, Castetter and Opler 1936, p. 43.

Food - Starvation Food - Seeds ground, rolled into balls and eaten raw only in times of food scarcity; Chiricahua & Mescalero, Castetter and Opler 1936, p. 43.

Food - Unspecified - Bark boiled or eaten raw; Chiricahua & Mescalero, Castetter and Opler 1936, p. 43.

***Pinus strobiformis* - Engelm. Southwestern White Pine**

Medicine - Drug - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Fuel - Wood - Lipan Mescalero, Morris Edward Opler Papers, [ca.

1960-1996].

Poaceae

***Alopecurus aequalis* var. *aequalis* - Shortawn Foxtail**

Other - Containers - Moist grass laid onto hot stones to prevent steam from escaping; Chiricahua & Mescalero, Castetter and Opler 1936, p. 36.

***Andropogon gerardii* Vitman - Big Bluestem**

Other - Containers - Grass used under fruit when drying; Chiricahua & Mescalero, Castetter and Opler 1936, p. 40.

Other - Containers - Moist grass laid onto hot stones to prevent steam from escaping; Chiricahua & Mescalero, Castetter and Opler 1936, p. 36.

Other - Containers - Used to cover fruit and allow ripening; Chiricahua & Mescalero, Castetter and Opler 1936, p. 39.

***Bouteloua curtipendula* (Michx.) Torr. - Sideoats Grama**

Other - Containers - Moist grass laid onto hot stones to prevent steam from escaping; Chiricahua & Mescalero, Castetter and Opler 1936, p. 36.

***Bouteloua* sp. - Grama Grass**

Other - Ceremonial Items - Plant used in ceremonial contexts; Chiricahua & Mescalero, Castetter and Opler 1936, p. 24.

***Muhlenbergia pauciflora* Buckl. - New Mexico Muhly**

Other - Containers - Moist grass laid onto hot stones to prevent steam from escaping; Chiricahua & Mescalero, Castetter and Opler 1936, p. 36.

***Muhlenbergia* sp. -**

Food - Bread & Cake - Seeds threshed, winnowed, ground and the flour used to make bread; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.

***Muhlenbergia wrightii* Vasey ex Coult. - Spike Muhly**

Other - Containers - Moist grass laid onto hot stones to prevent steam from escaping; Chiricahua & Mescalero, Castetter and Opler 1936, p. 36.

***Panicum bulbosum* Kunth - Bulb Panicgrass**

Food - Bread & Cake - Seeds threshed, winnowed, ground and the flour used to make bread; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.

Food - Sauce & Relish - Seeds ground, made into gravy and mixed with meat; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.

***Panicum obtusum* Kunth - Obtuse Panicgrass**

Food - Sauce & Relish - Seeds ground, made into gravy and mixed with meat; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.

Phragmites australis - (Cav.) Trin. ex Steud. Common Reed

Artifacts - Stem - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Cermony - Stem - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Medicine - Drug - Stem - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

***Schedonnardus paniculatus (*Nutt.) Trel. - Tumblegrass**

Other - Containers - Moist grass laid onto hot stones to prevent steam from escaping; Chiricahua & Mescalero, Castetter and Opler 1936, p. 36.

***Sorghum bicolor* - (L.) Moench Sorghum (not covered in text)**

Medicine - Drug - stem - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

***Sporobolus airoides* (Torr.) Torr. - Alkali Sacaton**

Other - Containers - Moist grass laid onto hot stones to prevent steam from escaping; Chiricahua & Mescalero, Castetter and Opler 1936, p. 36.

***Sporobolus cryptandrus* (Torr.) Gray - Sand Dropseed**

Food - Bread & Cake - Seeds threshed, winnowed, ground and the flour used to make bread; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.

Food - Porridge - Seeds boiled and eaten as porridge; Chiricahua & Mescalero, Castetter and Opler 1936, p. 48.

***Sporobolus wrightii* Munro ex Scribn. - Giant Sacaton**

Fiber - Brushes & Brooms - Stiff stems made into a brush and used to clean spines of cacti; Chiricahua & Mescalero, Castetter and Opler 1936, p. 40.

***Zea mays* - L. Maize**

Food - Seeds - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Polygonaceae

***Rumex aquaticus* var. *fenestratus* (Greene) Dorn - Western Dock**

Food - Unspecified - Leaves eaten without preparation or cooked with green chile and meat or animal bones; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.

Portulacaceae

***Portulaca oleracea* L. - Little Hogweed**

Food - Unspecified - Eaten without preparation or cooked with green chile and meat or animal bones; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.

Pteridaceae

***Cheilanthes fendleri* Hook. - Fendler's Lipfern**

Food - Beverage - Leaves and young stems boiled to make a non-intoxicating beverage; Chiricahua & Mescalero, Castetter and Opler 1936, p. 53.

Rosaceae

***Crataegus erythropoda* Ashe - Cerro Hawthorn**

Food - Bread & Cake - Fruit pressed into pulpy cakes, dried and stored; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Food - Fruit - Fruits eaten fresh; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Food - Winter Use Food - Fruit pressed into pulpy cakes, dried and stored for winter use; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

***Fragaria vesca* ssp. *bracteata* (Heller) Staudt - Woodland Strawberry**

Food - Fruit - Raw fruits occasionally eaten as food; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

***Prunus americana* Marsh. - American Plum**

Food - Dried Food - Fruits dried and stored for future food use; Mescalero, Basehart 1974, p. 50.

***Prunus* sp. - Chokecherry**

Drug - Antidiarrheal - Berries used for diarrhea; Mescalero, Basehart 1974, p. 48.

Drug - Burn Dressing - Ripe berries mashed and used for burns; Mescalero, Basehart 1974, p. 48.

Food - Bread & Cake - Berries ground, formed into cakes and dried; Mescalero, Basehart 1974, p. 48.

Food - Fruit - Berries eaten fresh; Mescalero, Basehart 1974, p. 48.

Other - Hunting & Fishing Item - Small shoots used to make arrow shafts; Mescalero, Basehart 1974, p. 48.

***Prunus virginiana* var. *melanocarpa* (A. Nels.) Sarg. - Black Chokecherry**

Food - Fruit - Fruit eaten fresh; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.

Food - Preserves - Fruit cooked to make a preserve; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.

Food - Winter Use Food - Fruits ground, pressed and saved for winter; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.

Medicine - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

***Rosa woodsii* var. *woodsii* - Woods' Rose**

Food - Fruit - Rose hips eaten fresh; Chiricahua & Mescalero,

Castetter and Opler 1936, p. 46.
Food - Preserves - Rose pulps squeezed into water and boiled to make jelly; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.
Food - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Fuel - Wood - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

***Rubus arizonensis Focke* - Arizona Dewberry**
Food - Bread & Cake - Fruit pressed into pulpy cakes, dried and stored; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.
Food - Fruit - Fruits eaten fresh; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.
Food - Winter Use Food - Fruit pressed into pulpy cakes, dried and stored for winter use; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Salicaceae

***Populus deltoides* ssp. *wislizeni* (S. Wats.) Eckenwalder - Rio Grande Cottonwood**
Food - Candy - Buds used as chewing gum; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.
- Medicine - Drug - Leaves - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

***Populus tremuloides* Michx. - Quaking Aspen**
Food - Bread & Cake - Inner bark scraped off and baked in the form of cakes; Chiricahua & Mescalero, Castetter and Opler 1936, p. 43.
Food - Spice - Sap used as flavoring for wild strawberries; Mescalero, Basehart 1974, p. 50.
Food - Unspecified - Bark boiled or eaten raw; Chiricahua & Mescalero, Castetter and Opler 1936, p. 43.

Scrophulariaceae

***Epixiphium wislizeni* (Engelm. ex Gray) Munz - Balloonbush**
Food - Unspecified - Pods eaten fresh or boiled; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

Solanaceae

***Physalis subulata* var. *neomexicana* (Rydb.) Waterfall ex Kartesz & Gandhi - New Mexican Groundcherry**
Food - Special Food - Fresh fruit eaten by children as a delicacy; Chiricahua & Mescalero, Castetter and Opler 1936, p. 45.

***Solanum fendleri* Gray ex Torr. - Fendler's Horsenettle**
Food - Bread & Cake - Plant dried, stored, ground into flour and used to make bread; Chiricahua & Mescalero, Castetter and Opler 1936, p. 42.

***Solanum jamesii* Torr. - Wild Potato**
Food - Vegetable - Unpeeled potatoes boiled and eaten; Chiricahua & Mescalero, Castetter and Opler 1936, p. 42.

Typhaceae

***Typha latifolia* L. - Broadleaf Cattail**
Drug - Unspecified - Pollen used as medicine; Mescalero, Basehart 1974, p. 46.
Fiber - Mats, Rugs & Bedding - Leaves used for lodge floor covering; Mescalero, Basehart 1974, p. 46.
Food - Unspecified - Rootstocks cooked with meat; Chiricahua & Mescalero, Castetter and Opler 1936, p. 47.
Food - Unspecified - Species used for food; Mescalero, Basehart 1974, p. 46.
Food - Unspecified - Stem bases eaten raw or cooked with other foods in early spring; Mescalero, Basehart 1974, p. 46.
Other - Ceremonial Items - Leaves used as ground covering for ceremonial tipis during the puberty ritual; Mescalero, Basehart 1974, p. 46.
Other - Ceremonial Items - Pollen sprinkled as a cross onto largest mescal crown; Chiricahua & Mescalero, Castetter and Opler 1936, p. 36.
Other - Ceremonial Items - Pollen used in many ceremonies; Mescalero, Basehart 1974, p. 46.

Ulmaceae

***Celtis laevigata* var. *reticulata* (Torr.) L. Benson - Netleaf Hackberry**
Food - Bread & Cake - Fruit ground, caked and dried for winter use; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.
Food - Fruit - Fruit eaten fresh; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.
Food - Preserves - Fruit used to make jelly; Chiricahua & Mescalero, Castetter and Opler 1936, p. 46.
Artifacts - Wood - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].
Food - Fruit/Pods - Lipan Mescalero, Morris Edward Opler Papers, [ca. 1960-1996].

Vitaceae

***Vitis arizonica* Engelm. - Canyon Grape**
Food - Dried Food - Fruit dried and eaten like raisins; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.
Food - Fruit - Fruits eaten fresh; Mescalero, Basehart 1974, p. 50.
Food - Fruit - Raw fruit eaten fresh; Chiricahua & Mescalero, Castetter and Opler 1936, p. 44.

Appendix E
Bibliography

The following bibliographies give a listing of the resources consulted in the production of this text. While all may not be cited, this list will be useful to the reader for further research.

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Appendix F
USDA Nomenclature and Index

Plant Utilization in Southeastern New Mexico: Botany, Ethnobotany, and Archaeology

William Whitehead & Conor Flynn

BLM

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Plant Utilization in Southeastern New Mexico: Botany, Ethnobotany and Archaeology

This guide covers the most common plants found in the Bureau of Land Management, Carlsbad Field Office (CFO) region and documents their uses by the Native peoples of Southeast New Mexico, both archaeologically and historically.

This book provides descriptions and photographs of 55 families, covering 172 species, with another 159 species mentioned as part of the description of a similar species, for a total of 331 plant species. There are over 700 photographs, 190 tables, and 190 figures. Discussion and summaries of the landscape, plant communities, archaeology, ethnobotany and paleoethnobotany are given to place the botanical information in a broad context, both in time and space.

This reference guide should be useful for professionals working in the fields of archaeology, ethnography, botany, biology, and natural resource management. It is hoped that it will be even more helpful, educational, and inspirational to members of the public without previous education or experience in these areas. We have endeavored to follow Thoreau's maxim to "simplify, simplify…" and every editorial decision has been made to design this book to be used by anyone.

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Bureau of Land Management

620 E. Greene Street

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Whitehead & Flynn