

Vegetative Analysis of Fort Davis

National Historic Site

by

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Summary

Fort Davis National Historic Site (FDNHS) is located near of the town of Fort Davis, Texas. The historic site was established in 1854 and served as a military post until 1891. The area supports diverse vegetation based on the geologic circumstances and based on past, and current, human use of the site. The dominant plant communities located within FDNHS include grama grassland, mixed-desert scrub, sotol scrub, montane chaparral, canyon scrub, and sandy arroyo scrub. Though major plant community types have remained the same, human disturbances with the surrounding vegetation have lead to significant changes in species composition over time. This report presents an analysis of historic and current vegetative conditions of Fort Davis through comparisons of historical vegetation lists and a current delineation of the vegetative communities at the site. Also documented are qualitative comparisons of vegetation changes through use of historic and modern photographs. The possible causes of vegetation change as a result of human disturbance are also discussed.

Introduction

Fort Davis National Historic Site (FDNHS) is a 186.16 hectare (460-acre) preserved historic fort located north of Fort Davis, Jeff Davis County, Texas. Fort Davis was established in 1854 by the Army in order to protect travelers and goods heading west, and also to protect the nearby settlements; it was abandoned in 1891 once the need for protection was dissipated. In 1961, the United States Congress created FDNHS as a unit of the National Park Service in order to preserve the historic remnants.

During the period of its occupation, the area around the fort was affected by the soldiers through the building of the barracks and other buildings, by the hunting of local wildlife, and by the use of the waters of Limpia Creek. The existence of the fort has touched the area in which it lies in many

ways.

The area is vegetatively distinct because it is part of a relatively mesic mountain range surrounded by a semi-desert grassland. This conjunction leads to the presence of arid-adapted species among more mesic species. In addition, the historic record for the area is fairly complete due to the record-keeping and photography of the army. In many ways the study was facilitated by the use of historic photographs, particularly in determining historic vegetative communities.

Though established for its cultural/historic values, the national historic site contains many natural features including: (1) two mountains, Sleeping Lion and North Ridge, (2) Hospital Canyon (located at the juncture of the two mountains), (3) a large expanse of flat level ground, (4) an intermittent waterfall and creek, (5) an area of historic cottonwood trees, and (6) an offsite major water source, Limpia Creek. All of these physical features help to contribute to the diversity of plant life at FDNHS. The objectives of this study were to provide a comparison of the historic vegetation of Fort Davis with current conditions, describes some of the most distinct changes that have taken place, and to identify some of the potential causes for the noted vegetation alterations.

Study area

Geology

The mountains in the area of FDNHS are some of the most beautiful and distinct mountains of Texas. As a whole, the Davis Mountains are evidence of the area's volcanic past. The mountains were created by Tertiary volcanic eruptions (Hinckley, 1944; Snyder, 1962; Baker, 1934; Larke, 1989) which occurred over a period of five million years (Larke, 1989). The craggy parts of the higher elevations are composed of igneous rocks (Baker, 1934).

The geology at FDNHS is complex and varied. Everett (1967) noted that the area where the lowest rock unit was visible was at the mouth of the Hospital Canyon and at the base of the slopes of the canyon, and that the exposed rock was the upper portion of a "vesicular, fine-grained, medium gray pyroxene andesite flow." He went on to state that the rock type overlying the andesite flow is a thick section, the topmost portion of which is an escarpment of rhyolite porphyry. This rhyolite porphyry is visible on Sleeping Lion Mountain and along the switchbacks of the Tall Grass Loop Nature Trail that runs along the top of North Ridge Mountain. At the north side of the Hospital Canyon an ash flow tuff above the rhyolite porphyry grades upward from a black vitrophyre to a recrystallized vitric-crystal tuff (Everett, 1967).

Throughout FDNHS numerous rock intrusions are found, particularly on the slopes and tops of the two mountains. Snyder (1962) reported that the intrusions are mostly syenite porphyry, but monzonite and granite are present as well.

Soils

The geologic diversity of the site has resulted in a diversity of soil types/complexes. Soils are

distinct between the low elevations of the Fort's historic military parade grounds versus the soils of Hospital Canyon and the two mountain areas.

The parade grounds and flat areas are comprised of the Musquiz association of soils. The groupings of soils within this association consists of 50 to 70 % Musquiz soils, 10 to 30 % soils that are similar to Musquiz soils (including Redona, Chispa, Santo Tomas, Verhalen, and Reagan soils), and 0 to 40 % other soils. The soils of this association have a high available water capacity (Turner, 1977).

The Hospital Canyon soils are the Gageby series of deep, noncalcereous, loamy, well-drained soils. The Gageby association contains 80 to 90 % Gageby soils and 0 to 20 % other soils. The other soils include Rockhouse, Medley, and Santo Tomas soils. The Rockhouse soils are located on low ground by the dry stream bed. The Gageby association has high available water capacity (Turner, 1977).

The slopes of North Ridge Mountain, including the slopes of Hospital Canyon, consist of the Santo Tomas-Medley association of soils. The Santo Tomas-Medley association contains 20 to 60 % Santo Tomas gravelly loam, 30 to 70 % Medley loam and 10 to 40 % other soils (Turner, 1977). The soils of the association include Boracho, Espy, Limpia, Brewster, and Volco soils. The Santo Tomas soils have medium available water capacity while the Medley soils have high available water capacity (Turner, 1977).

The soils of North Ridge and Sleeping Lion mountains are of the Rock outcrop-Brewster association. The Rock outcrop-Brewster association consists of 50 to 90 % igneous rock outcrop, 10 to 40 % Brewster soils, and 0 to 20 % other soils. This association has rocky soils and a low water capacity (Turner, 1977).

Nelson (1981) divided FDNHS into four groups of soil types and drew a correlation between some

soil types and vegetative community types. He indicated the presence of a loamy site, a gravelly site, a draw site, and igneous hill and mountain range sites. Using these four soil distinctions, Nelson identified their associated vegetation assemblages. The loamy site consists of 35 % Blue Grama (Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths), 20 % Side-oats Grama (Bouteloua curtipendula (Michx.) Torr.), 10 % Cane Bluestem (Bothriochloa barbinodis (Lag.) Herter), five percent Black Grama (Bouteloua eriopoda (Torr.) Torr.), five percent Arizona Cottontop (Digitaria californica (Benth.) Henr.), one percent other perennial grasses, five percent forbs, and one percent woody species. The gravelly site consists of 15 % Side-oats Grama, 15 % Black Grama, 15 % Blue Grama, 10 % Cane Bluestem, 10 % perennial three-awns (Aristida spp.), 25 % other perennial grasses, five percent forbs, and five percent woody vegetation. The draw site consists of 20 % Side-oats Grama, 20 % Cane Bluestem, 12 % vine mesquite (Prosopis spp.), five percent Green Sprangletop (Leptochloa dubia (Kunth) Nees), five percent Blue Grama, 14 % other grasses, four percent forbs, and 20 % woody vegetation. The igneous hill and mountain range sites contain more medium and tall grasses than blue grama (Nelson, 1981).

Life Zone

The FDNHS area lies within the Upper Austral life zone and the Upper Sonoran faunal area according to Merriam (1898). Bray (1905) indicated that the study area is in a “transcontinental belt” of warm temperature called the Lower Austral Life Zone. Blair (1940) classified the area as the Plains life belt. Shreve (1942), when discussing the North American Deserts, indicated by his map that the area of FDNHS falls entirely outside the area he defines as the North American Desert and its subdivisions. While Blair (1950) conceded that the entire area of Trans-Pecos, Texas

(excluding the Guadalupe Mountains) is included within the Chihuahuan Biotic Province, he noted that the “strip running from Culberson County south to the Davis Mountains is classified as semi-arid.” Jaeger (1957) noted that “conspicuous on this desert are the rolling grasslands of the volcanic soils, the creosote bush plains, and the cactus savannas and agave thickets of the limestone soils.” On the other hand, Lloyd and Schmidt (1980) indicated that all but the “highest elevations” of the area should be considered true desert. Cronquist (1982) placed the area within the Holarctic Kingdom, Madrean Subkingdom, Madrean Region, Sonoran Province, and specifically, the Chihuahuan Subprovince. Risser (1995) additionally pointed out evidence by stating:

“Over the last 50 years, the boundary of the desert shrub-to-semiarid grassland zone moved northward into semiarid grassland. With this movement of the transitional zone, there was an accompanying increase in the size of habitats occupied by the desert shrub community. During this movement, the desert shrub zone near the ecotone became more like the interior of the desert shrub biome, and patches of desert shrub invaded the area previously dominated by semiarid grassland.”

Carter and Cory (1932) divided the Trans-Pecos region into five vegetative groups. They placed the area around FDNHS into the grassland group and noted that it belongs specifically to the “Roughland-grassland of relatively thick cover.”

Blair (1940) further indicated that the Davis Mountains have two “life belts.” One life belt is the area including the plains surrounding the mountains as well as the valley stretches between the mountains. The second life belt consists of the roughlands of the main mountain masses and peaks. This distinction places the FDNHS area within both life belts. For the purposes of this study, based

on the information presented, FDNHS is considered part of the Chihuahuan Biotic Province.

Paleobotany

To understand the vegetation/climate relationship of the area it is helpful to consider the relationships of thousands of years ago. The Middle Wisconsin period (33,500 to 22,500 years Before Present (B.P.)) was probably a period of cool and moist weather for west Texas (Bryant and Holloway, 1985). During the Wisconsin pluvial the area of desert shrubland in the Chihuahuan Desert was inhabited by “decidedly xerophilous” woodlands (Wells, 1966). Wells (1966) described the Wisconsin pluvial climate for the low elevations in the area as “sufficiently moist” to allow the disjunct mountain species to move across the mountain valleys, thus permitting the relictual islands of species currently found on isolated mountain ranges. Milstead (1960) noted that the pluvial periods following the Pleistocene allowed for the advancement of mesic-adapted species from the east. However, Wells (1966) argued that the pluvial climate of the Wisconsin allowed for an expansive growth of montane but xerophilous pinyon-juniper-oak woodland.

An increase in the amount of winter precipitation and a reduction in summer temperatures encouraged the plant distributions in the Late Wisconsin period (Van Devender and Spaulding, 1979). The climate of the Late Wisconsin period greatly affected the paleovegetation. The climate during the Late Wisconsin was one of mild winters and cooler summer temperatures than currently experienced. The milder winters and cooler summers maintained playa lakes, reduced water stress for plants, and resulted in a reduction in evaporation (Van Devender and Spaulding, 1979). Bryant and Holloway (1985) defined the climate of Full-Glacial west Texas as cool and humid. The climate of the Full-Glacial period is correlated to a vegetative association of pinyon-juniper-oak woodlands, an association that exists today in the higher altitudes of the mountains of the area (Van Devender et

al., 1978; Van Devender and Spaulding, 1979). Bryant and Holloway (1985) also indicated that grassland and steppe conditions present prior to the Full-Glacial period (22,500 to 14,000 years B.P.) were replaced by conifer forests.

The Late Glacial period in west Texas (14,000 to 10,000 years B.P.) represented a time of climatic and vegetative changes. Conifer forests at low elevation were replaced by grassland areas while conifers at the higher elevations of the region persisted (Bryant and Holloway, 1985; Van Devender and Spaulding, 1979).

The Early Holocene (11,000 to 8,000 years B.P.) climate had lasting changes on the vegetation of the region that are still present today. The winter precipitation typical of the Late Wisconsin persisted through the Early Holocene (Van Devender and Spaulding, 1979). The present water circulation cycle, rainfall patterns, and biotic adaptations are probably a product of the continental ice sheets melting during this period (Van Devender and Spaulding, 1979). The wet, mild winters and cool summers (Van Devender and Spaulding, 1979) continued to be warmer and drier with a resulting marked decrease in forests, an increase in scrub grasslands, and vegetation characteristic of desert areas (Bryant and Holloway, 1985; Van Devender and Spaulding, 1979).

The Middle Holocene (8,000 to 5,000 years B.P.) is distinguished by the continuation of the vegetative changes that began in the Early Holocene with the retreat of the glacial period. The mesic species withdrew to the higher elevations of the region and the upper latitudes, and xeric species spread into new areas. The grassland communities of the Middle Holocene were gradually altered into the succulent communities and desert scrub that are present today. The Early Holocene woodlands appear to have been converted to the present conditions in a “rapid, widespread, synchronous event” that occurred approximately 8000 years B.P. (Van Devender and Spaulding,

1979).

At the present time the Chihuahuan Desert is located in relatively high elevations and the climate supports xeric grassland communities as well as scrub communities (Van Devender, 1977). The loss of extensive amounts of soil during the Middle and Late Holocene (5,000 years B.P. to current time) contributed to the formation of arid micro-habitats with the associated desert vegetative aspect (Van Devender, 1977). The development of arid scrub communities in the Late Holocene is a major vegetative change induced by climate; it represents the “most recent major vegetational change in the Southwest” (Van Devender, 1977).

According to the paleofloristic history of the Chihuahuan Desert region, it seems obvious that change is an integral part of the area. The changes of the past have allowed the more mesic-adapted species to advance, spread, and then withdraw again. The climate of the region is predicted to become warmer and drier (Bryant and Holloway, 1985), a process that began in the Post-Glacial period and continues today. This climatic progression offers a clue to the current drought conditions--perhaps the decreasing moisture in the region is a continuation of the Post-Glacial warming/drying trend.

Precipitation

Rainfall is an essential factor in shaping the vegetation of a region. In areas of high rainfall a fluctuation may not seem important, but in an arid region a fluctuation of a few centimeters can have profound consequences. The precipitation of an area may be more instrumental in determining the vegetative aspect than the thermal cycle of seasons (Shreve, 1915).

Rainfall at FDNHS during the study period has been varied. The total rainfall of the years 1995,

1996, and 1997 was 125.81 cm (Table 1). Annual rainfall for 1885 was 59.64 cm (Havard, 1885).

Table 1. Rainfall of FDNHS (cm) for the Years 1995, 1996, and 1997*

Month	1995	1996	1997
January	.46 cm	.53 cm	.64 cm
February	.16 cm	.36 cm	2.31 cm
March	.79 cm	.25 cm	.18 cm
April	.33 cm	.33 cm	4.24 cm
May	2.87 cm	.05 cm	7.67 cm
June	8.00 cm	5.72 cm	3.86 cm
July	2.36 cm	4.65 cm	8.31 cm
August	5.84 cm	11.58 cm	12.22 cm
September	9.35 cm	14.17 cm	1.8 cm
October	3.23 cm	3.02 cm	.84 cm
November	1.50 cm	2.44 cm	1.8 cm
December	.61 cm	.03 cm	2.84 cm
Total	35.97 cm	43.13 cm	46.71 cm

* Data cover the months of the study and were collected on site by the National Park Service.

The year 1885 was much more moist than the current study years of 1995, 1996, 1997. Of these three years the greatest amount of rain fell during 1997 and totaled 46.71 cm.

The first year of the survey yielded 35.97 cm of rain. The year 1996 witnessed 43.13 cm of rain, or 7.16 cm more than 1995. The year 1997 had 46.71 cm of rain, 3.58 cm more than 1996 and 10.74 cm more than 1995.

Temperature

Temperature, while not as significant as rainfall, also impacts the vegetation of an area. Because higher temperatures lead to higher rates of evapotranspiration it is helpful to understand the temperature of FDNHS in order to comprehend the current vegetation patterns.

Carter and Cory (1932) noted the mean temperature at FDNHS for the year 1932. During summer months the mean temperature was 23.76° C. The mean annual temperature was 16.00° C. Carter and Cory (1932) also note that FDNHS endured a period of 227 days of above-freezing temperatures.

Havard (1885) documented the mean temperature of FDNHS, as well as precipitation information. During 1885 FDNHS had a mean temperature of 16.58° C, which was lower than other areas of the same longitude (Havard, 1885).

During 1995 FDNHS had an average high of 24.70° C and an average low of 6.82° C; 1996 registered an average high of 25.52° C and an average low of 6.64° C; and 1997 had an average high of 24.10° C and an average low of 7.11° C for the months January through July (Table 2).

Table 2. Average Monthly and Yearly High and Low Temperatures for the Years 1995, 1996,
and 1997 at Fort Davis National Historic Site.*

	'95 High	'95 Low	'96 High	'96 Low	'97 High	'97 Low
January	15.63°	-1.90°	17.35°	-2.83°	14.98°	-2.21°
February	20.63°	1.78°	21.86°	1.48°	16.05°	-0.48°
March	20.76°	2.06°	20.57°	-0.23°	22.46°	3.48°
April	24.37°	4.48°	25.78°	5.26°	21.60°	5.37°
May	29.56°	12.57°	33.92°	13.39°	28.15°	11.87°
June	31.60°	13.65°	35.23°	16.76°	32.61°	14.78°
July	31.26°	14.95°	32.47°	16.04°	32.82°	17.74°
August	31.31°	15.59°	29.75°	14.91°	n/a	n/a
September	28.45°	12.95°	25.02°	8.61°	n/a	n/a
October	26.69°	5.93°	24.95°	5.61°	n/a	n/a
November	20.92°	1.78°	21.72°	2.02°	n/a	n/a
December	16.56°	-1.38°	17.69°	-1.31°	n/a	n/a
Average	24.70°	6.82°	25.52°	6.64°	n/a	n/a

* Data were collected on site by the National Park Service.

Historic Collection

The previous botanical work of the Davis Mountains area is thorough. The collections conducted during the 1800's provide insight into the vegetation and vegetative communities of the area historically. While few collections were made from FDNHS proper, many collections were made close by. For the purposes of this study, all specimens collected from the Limpia Creek or other nearby locales, described variously as Wild Rose Pass, Davis Mountains, or other names, were included in the lists of the historic plants of FDNHS. Specific locations are often vaguely indicated, generally described, and sometimes incorrectly described within historic accounts. Generally, though, all historic descriptions used for this study were from within the Davis Mountains or within approximately 10 miles of the current FDNHS.

The collectors of the 1800's included Charles Wright (collected in 1850 and 1851), John Torrey (collected in 1859), George Engelmann (collected in 1859), and Valory Havard (collected in 1885). Other botanical information from the 1800's comes from such sources as soldiers, commentary from travelers, and horticultural information. Botanical information in the 1900's is the result of the 1981

study by Nelson and from the inventory of the FDNHS herbarium.

As is frequently the case when dealing with historic commentary of plants, many common names used refer to different species than they do today. Some common names are no longer used, and/or many scientific names have been changed as a result of taxonomic revisions. In most cases, synonyms for the historic scientific names were located in Kartesz (1994), and in the Gray Herbarium at Harvard University.

In some cases no synonym could be identified. In these situations, the historic scientific name is listed, unaltered, and is distinguished with an asterisk within the Appendix. Identification of common names was facilitated by Correll and Johnston (1970), Powell (1988), Powell (1994), Ajilvsgi (1984), Brako et al. (1995), and Warnock (1977).

Charles Wright

Charles Wright collected throughout the Trans-Pecos region of West Texas during 1850 and 1851. The Trans-Pecos refers to the area of land west of the Pecos, ending east of the Rio Grande. His collections were identified and catalogued by Asa Gray. Wright's collections (Appendix 1) from near FDNHS (the location identified as Limpia River or Limpio River) include 132 species from 26 families (Gray, 1852). Thirty three species (25%) from Wright's collections are currently found inhabiting FDNHS.

In addition to the invaluable plant collections made by Charles Wright, the comments he made while passing through the region provide a glimpse into the natural appearance of FDNHS (Gray, 1852; Hinckley, 1950; and Shaw, 1987). On his return trip through the area, Wright commented that the Limpia Creek was "perfectly dry" and that there was evidence of a recent widespread fire that "had

swept over the whole country to the very summit of the mountains” (Shaw, 1987).

John Torrey and George Engelmann

John Torrey collected throughout the general region of West Texas during 1859 (Appendix 2). Torrey’s collections identified 94 species representing 39 families, including collection of several previously uncollected grass species. There are 13 species (14%) of Torrey’s listed species on the current list. During the same expedition George Engelmann collected cacti (Appendix 3). His short list (seven species) marks the first scientific note of cacti near FDNHS. The current vegetation analysis at FDNHS revealed only one of the seven cactus species, Engelmann Prickly Pear, that was represented in Engelmann’s historic collections.

Valory Havard

Valory Havard collected throughout the region during 1885 (Appendix 4). In addition to providing a list of species found in the area during his exploration, Havard also noted vegetative associations within valleys, dry stream beds, and the shade of boulders. Havard’s list indicates the presence of 77 species representing 37 families in the area. Twenty-three (30%) of the species collected by Havard were found in the current survey.

James Nelson

James Nelson performed a floristic survey in 1980 and created a list of observed plant species (Nelson, 1981). This list contained five species that had not been previously mentioned by historic botanical surveys (Appendix 5). Two of the five new species identified by Nelson were also

identified during the current study. Nelson additionally compared historic photographs with new photography that he had taken in exact locations in order to qualitatively discern vegetative changes over time. In these qualitative comparisons, Nelson noted that shrubs had proliferated and he provided suggestions for invasive shrub removal.

Other Botanical References

Wooster (1990) reports that the soldiers used material from nearby areas to build structures made of oak and cottonwood and used mud mixed with prairie grass to fill in the gaps. Robert Grierson, who lived at Fort Davis, mentioned a plant called “prairie cabbage” that tasted “like boiled cabbage . . . when cooked up with bacon;” Wooster notes that the plant described is probably the mescal plant (Wooster, 1990).

The documentation of landscaping and horticultural practices contributed to the knowledge of plants occurring during the 1800's. One horticulture mail-order magazine suggested such garden species as Phlox (Phlox drummondii) and Honeysuckle (Foy and Schlereth, 1992). The landscaping of the officers' row added cottonwoods as well as madeira vines (for shading the front porch) and Bermuda Grass (Cynodon dactylon (L.) Pers.) (as a lawn grass) (Wooster, 1990).

Post gardens were beneficial to FDNHS in several ways. The soldiers grew sweet potatoes, beets, carrots, cucumbers, melons, onions, squash, tomatoes, Irish potatoes, cabbage, celery, and sugarcane which resulted in the availability of a wide variety of vegetables, an important problem in frontier forts where food had to be shipped long distances and at no small cost or danger (Wooster, 1990). In addition to historic works, the accumulation of identified specimens located in the FDNHS herbarium contributes a more recent plant list (Appendix 6). The collections found in the FDNHS

herbarium date from the 1970's with some additions made by Nelson in 1981. The collection contains specimens of 193 species representing 57 families. Of these, 96 species (50% of the herbarium collections) are represented in the current survey. Each specimen was reviewed by the author in order to insure the identification of the species. The names were synonymized in accordance with Kartesz (1994).

Methods and Materials

Current Plant Collections

The current plant list was obtained from the collections made during a two year period beginning in August, 1995, and ending in June, 1997. Plants were collected from throughout the FDNHS over the two year period including the flat areas, Hospital Canyon, the top and slopes of North Ridge mountain (inside the boundaries of FDNHS), and the slopes of Sleeping Lion mountain (inside the boundaries of FDNHS).

Plants were identified according to Correll and Johnston (1970), Powell (1988), and Powell (1994). In addition, many collected specimens were compared to herbarium specimens at Sul Ross State University. Current synonymy was facilitated by Kartesz (1994), Correll & Johnston (1970), and by access to the Gray Herbarium at Harvard University through the Internet.

Two collections were made of each species. The collections were pressed and dried. One set is stored at FDNHS and one is stored in the Sul Ross State University Herbarium. All data were incorporated into the Natural History database at FDNHS. This herbarium collection is a very complete representation of the vegetation at FDNHS.

Historic Plant Collections

The historic plant list was compiled from information in the works of historic collectors. If the locality of a plant collection was given as Fort Davis, Limpia Creek, Wild Rose Pass, or any nearby locality in the Davis Mountains, the plant was assigned to the historic plant list.

Current synonymy for scientific names was established with reference to Kartesz (1994) and the Gray Herbarium. Only those botanical notations/references made during the time of military activity

at Fort Davis (mid- to late- 1800's) have been cited in the historic plant lists (Appendices 1-4).

Current Vegetative Communities

Current vegetative communities of FDNHS were determined based on vegetative communities described by Hendrickson and Johnston (1983). No attempt was made by the author or by Hendrickson and Johnston to quantify vegetative communities as listed; rather, community types were determined by dominant species. Creation of a map defining vegetative communities involved scanning aerial photography of the FDNHS (Figure 1) into a computer, obtaining Global Positioning Satellite (GPS) points from various localities within the boundaries of FDNHS, entering these GPS points into the scanned image of the aerial photograph, and printing an enlarged version of the aerial photograph. Vegetative communities were visible in the infra-red photograph and were traced on a larger map. The infra-red nature of the photograph indicated living vegetation with degrees of redness. In addition, individual plants are somewhat visible with a magnifying glass (although identification is difficult). After tracing the outlines of vegetative communities and creating a key, the map was copied onto the aerial photograph, colored, and reprinted.

Historic Vegetative Communities

The delineation of historical vegetative communities was based on photographs from the 1800's (see photopoints 1-14). In most cases, the identification of individual species from historic photographs is tentative and therefore was not attempted in this study. Based on comparisons between historic descriptions and the current vegetation assessments at FDNHS, major vegetative community types appear to have remained similar. One problem that must be noted is the period of years between

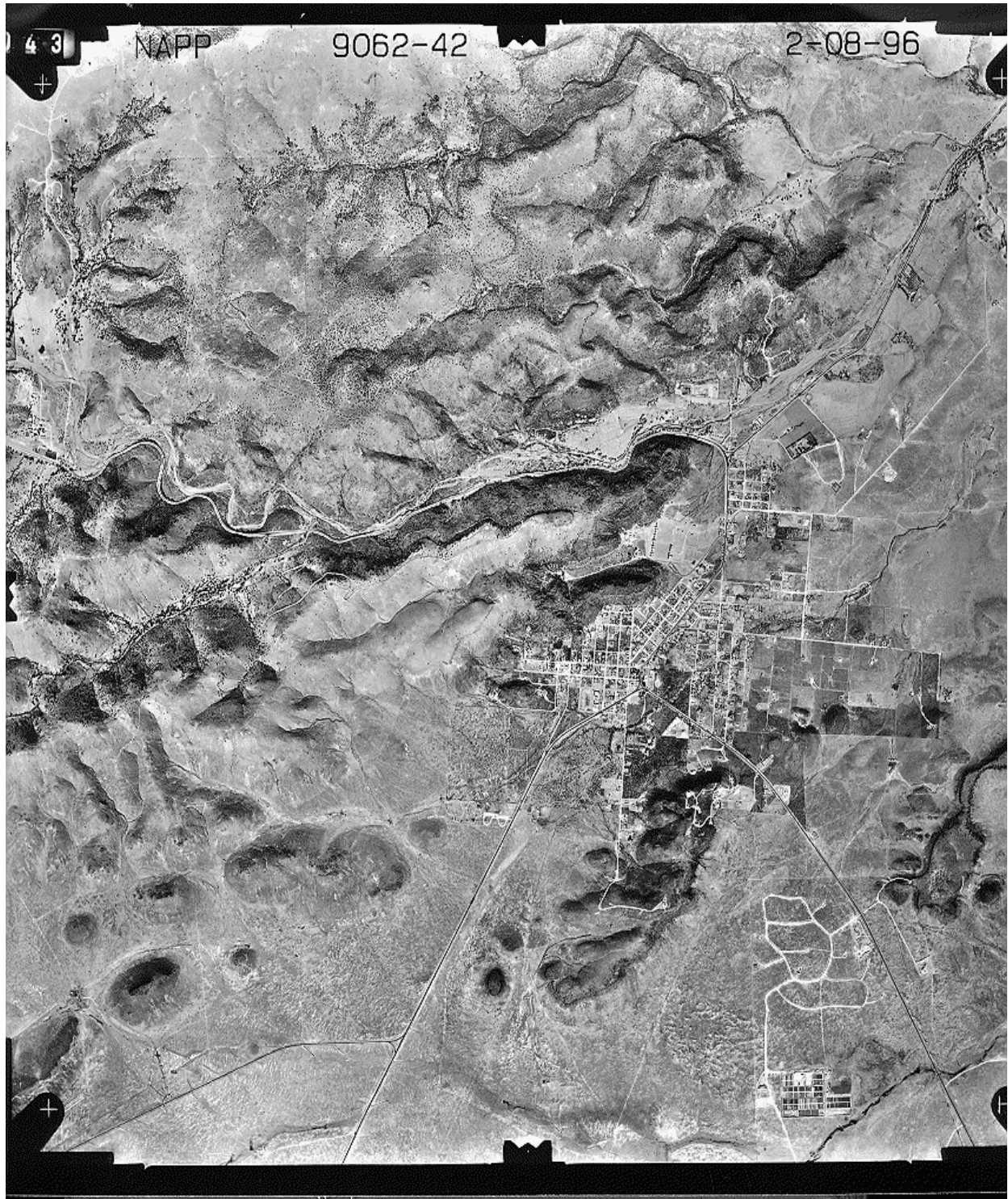


Figure 1. Aerial Photograph of Fort Davis National Historic Site.

photographs. Very few photographs from the same year were available for use in the historic vegetative community delineation. Furthermore, these photographs are spread over several decades. Therefore the vegetative communities may have changed in shape, density, location, composition, and/or size during each interim. However, assembling historic photographs from different years and creating a map of historic vegetative communities is valuable, even if it might be somewhat inaccurate.

Photopoints

The photopoints are based on a series of photographs by Nelson (1981) simulating historic photographs of the land surrounding FDNHS. These photographs demonstrate vegetative change between the 1800's and 1981. These photographs were retaken during the current study in an attempt to show vegetative change between 1981 and 1997. In addition, the degree of change between the current photographs and the historic ones are of use in determining the progress of vegetative changes. The accuracy of the replicated photographs was achieved by attempting to line up natural and manmade landmarks in the approximate position as the historic photographs show them when retaking the current photography.

Results and Discussion

Current Plant List

The current plant list indicates that there are at least 227 species and 57 families present on FDNHS currently (Appendix 7). There are 104 species included on the current plant list that were not mentioned by the historic collectors or in the FDNHS Herbarium. Seven families collected currently

were not mentioned historically or in the FDNHS Herbarium.

Historic Vegetative Communities

Four distinct vegetative communities occurred at Fort Davis during 1854 through 1891, based on an evaluation of historic photographs. These communities include grama grassland, mixed-desert scrub, sotol scrub, and montane chaparral. Two additional communities exist today (sandy arroyo scrub and canyon scrub), but these plant types cannot be included or discounted from the historic vegetative communities present at the site. No historic photography is available for the long corridor between Sleeping Lion and North Ridge mountains for the time period between 1854 and 1891. Photography of this corridor does exist from the 1920's and 1940's, but it is too recent and too disjunct chronologically from the 1800 photograph grouping to allow for any accurate assumption of the presence or absence of sandy arroyo and canyon scrub vegetation at FDNHS during the second half of the nineteenth century. Potential areas of the four known vegetation types are described below and delineated as best as possible from use of historic photographs in Figure 2.

Grama grassland

Grama grassland communities historically occurred in the parade grounds and the surrounding flat areas. Due to a lack of photographic evidence, it is impossible to determine if the flat top of North Ridge Mountain supported a grama grassland community as well. The historic photographs showing the grama grassland community are AB-6, HG-4/6, AB-15, AB-11, HG-14, HG-21, HG-16, and HD-31.

Mixed-desert scrub

The mixed-desert scrub community historically occurred over vast areas of the slopes of North Ridge and Sleeping Lion mountains. Based on historic mid- to late-1800 photographs, this scrub community type appears to have been considerably more sparse than is noted today. Mixed-desert scrub photographs from the photopoints are AB-11, HG-14, HG-16, and AB-18.

Sotol scrub

Historic photographs of the Sotol scrub community (photographs listed as HG-1 and HG-10 catalogued at FDNHS) show that this community spread from just north of the parade grounds and just north of the chapel to the north and east.

Montane chaparral

The montane chaparral vegetative community was perhaps the most infrequent vegetative community present historically. From photographic evidence (see photopoints) the montane chaparral vegetative community existed in small areas on North Ridge Mountain at the southeastern-most cliff base. In addition, an apparent runoff area behind the Hospital (and more specifically behind the magazine) was montane chaparral. Beyond Hospital Canyon, historic photographs show a draw with montane chaparral along the cliff bases. This area represents the largest montane chaparral formation known historically in the study area. Sleeping Lion Mountain had no known or identifiable montane chaparral vegetative community, however it is entirely possible that the top of the mountain supported a small stand. It is difficult to determine if this is the case because photographs show only the edge of the top of the mountain--clearly not enough information to define

the area as a montane chaparral vegetative community. Photopoint photographs documenting montane chaparral include AB-6, HG-4/6, HG-3, AB-15, BA-4, HG-14, HG-21, AB-16, AB-18, and AB-4.

Current Vegetative Communities

Although FDNHS is relatively small in area, approximately six vegetative communities occur throughout FDNHS (Figure 3). The elevational differences and differences in the availability of sunlight and water provide for multiple vegetative communities. Henrickson and Johnston (1983) found numerous vegetative community types throughout the Chihuahuan Desert region, including montane areas. Of these types, six were found to be applicable to FDNHS based on community definition, composition, description, and habitat location. The six plant communities described by Henrickson and Johnston (1983) currently located at FDNHS include grama grassland, mixed-desert scrub, Sotol scrub, sandy arroyo scrub, canyon scrub, and montane chaparral communities.

Grama grassland

This vegetative community covers “large gentle to moderate slopes of coarse sandy soils derived from extrusive igneous rocks” (Henrickson and Johnston, 1986). Henrickson and Johnston (1986) indicated that “at least three-fourths of the ground surface” coverage by the plants listed below constitutes a grama grassland. Evaluation of infrared aerial photography indicates that the suggested areas have the requisite three-fourths ground cover of grama grassland species. The species occurring at FDNHS include Blue Grama (Bouteloua gracilis), Side-Oats Grama (Bouteloua curtipendula), Cane Bluestem (Bothriochloa barbinodis), Johnsongrass (Sorghum

halapense), and Deergrass (Muhlenbergia rigens). Grama grassland at FDNHS includes the parade grounds and surrounding flat areas, the area surrounding and snaking away from the cabin in the Hospital Canyon, the flat areas on top of North Ridge Mountain, and the flat areas to the east.

Mixed-desert scrub

This vegetative community could be described as the “catch-all community.” Henrickson and Johnston (1986) indicated that “no single species” dominates this community and that the community usually takes on a “mosaic,” shifting species composition with variation in slope, exposure, and soil type. Some species found in this community at FDNHS include Wright Thelypody (Thelypodium wrightii), White-Thorn Acacia (Acacia constricta), Catclaw Mimosa (Mimosa aculeaticarpa var. biuncifera), and Side-Oats Grama (Bouteloua curtipendula). The areas at FDNHS where this community type occurs are on the lower slopes of North Ridge and Sleeping Lion Mountains and on the fringe of the grassland on top of North Ridge Mountain. In addition, the slopes of the Hospital Canyon have small areas of this community type. At FDNHS, the mixed-desert scrub community marks the intergradation area between montane chaparral and grama grassland. On the flat areas at FDNHS, the mixed-desert scrub seems to occur in places that are not regularly mowed by the maintenance workers.

Sotol scrub

Henrickson and Johnston (1986) listed numerous species associated with this vegetative community type. At FDNHS, the applicable species include: Soaptree Yucca (Yucca elata), Sotol (Dasyllirion leiophyllum), White-Thorn Acacia (Acacia constricta), Oreganillo (Aloysia

wrightii), Damianita (Chrysactinia mexicana), Tatalencho (Gymnosperma glutinosum), Catclaw Mimosa (Mimosa aculeaticarpa var. biuncifera), Little Leaf Sumac (Rhus microphylla), Mexican Buckeye (Ungnadia speciosa), Dentateleaf Goldeneye (Viguiera dentata), Prickly Pear (Opuntia spp.), and Threadleaf Groundsel (Senecio flaccidus var. douglassii). Henrickson and Johnston (1986) noted that Yucca and Sotol plants have at least a visual dominance in this community, but not a quantitative dominance. Yucca and Sotol plants are “conspicuous elements among a highly variable grass-shrub-dominated understory” (Henrickson and Johnston, 1986).

The Sotol scrub community occurs on limestone hills and slopes throughout the Chihuahuan Desert region (Henrickson and Johnston, 1986). At FDNHS, the Sotol scrub community exists primarily in a small area just north of the parade grounds.

Montane chaparral

Henrickson and Johnston (1986) described the montane chaparral vegetative community as corresponding to the following species at FDNHS: Gray Oak (Quercus grisea), Emory Oak (Quercus emoryi), Evergreen Sumac (Rhus virens), Agarito (Mahonia trifoliata), Texas Mountain Laurel (Sophora secundiflora), Damianita (Chrysactinia mexicana), and species of Mimosa, Salvia, Eupatorium, Agave, Nolina, Dasyllirion, and various grasses.

Montane chaparral is typically found on mountain slopes. The plants in the montane chaparral community are generally “shrubs 1-2 m tall with relatively small, hard-textured, usually persistent or semi-deciduous leaves” (Henrickson and Johnston, 1986). The montane chaparral community at FDNHS occurs along the bases of the cliffs on the east and south side of North Ridge Mountain, and over a large area from the north and northeast slopes of North Ridge

Mountain continuing north to the boundary marking the north and northwest margins of FDNHS.

In addition, the cliff bases, the upper and some lower slopes of Sleeping Lion Mountain, the areas right above the mixed-desert scrub in the Hospital Canyon, and along the cliff edges of Hospital Canyon, have extensive montane chaparral vegetative community stands.

Sandy arroyo scrub

Henrickson and Johnston (1986) indicated that the species composition of the sandy arroyo scrub community type include such FDNHS residents as California Brickellia (Brickellia californica), Resinleaf Brickellia (Brickellia baccharidea), Net-leaf Hackberry (Celtis laevigata var. reticulata), Desert Willow (Chilopsis linearis), White-Thorn Acacia (Acacia constricta), Texas Black Walnut (Juglans microcarpa), and Willow Baccharis (Baccharis salicina). Throughout the Chihuahuan Desert region this community type occurs along sandy arroyo edges (Henrickson and Johnston, 1986). The sandy arroyo scrub community occurs in the dry stream bed between North Ridge and Sleeping Lion mountains along the long corridor leading to Hospital Canyon.

Canyon scrub

According to the definition by Henrickson and Johnston (1986), the species comprising the canyon scrub vegetative community type at FDNHS include Texas Persimmon (Diospyros texana), Texas Virgin's Bower (Clematis drummondii), Mexican Buckeye (Ungnadia speciosa), Little-leaf Lead Tree (Leucaena retusa), Agarito (Mahonia trifoliata), Little Leaf Sumac (Rhus microphylla), Texas Mountain Laurel (Sophora secundiflora), Waxy Cloak Fern (Astroblepis sinuata ssp. sinuata), Rock Ferns (Pellaea spp.), and Resurrection Ferns (Selaginella

spp.). In the Chihuahuan Desert region this vegetative community type occurs in rocky canyon habitats (Henrickson and Johnston, 1986). The canyon scrub community occurs in a small area at the innermost part of the Hospital Canyon. This location has an occasional pool fed by an intermittent waterfall.

Photopoints

Photopoint photography comparisons indicate varying degrees of change throughout FDNHS. Each image reflects change differently according to its location within FDNHS. Locations that are routinely maintained by Park Service personnel do not exhibit the dramatic differences in vegetation that are visible on some of the slopes.

Photopoint 1

Current vs. Historic (Fig. 4)

The foreground is very similar in both photographs--grama grassland sparsely vegetated with short, clumpy grass. The background shows montane chaparral encroachment. The current photograph shows areas that are somewhat bare, but the montane chaparral encroachment is notable on the slopes of North Ridge Mountain. Nelson (1981) states that the historic photograph was taken in 1875. The historic photograph is documented as AB-6 in the FDNHS museum.

Current vs. 1981

The foreground is very similar here as well. The slopes of North Ridge Mountain show a slight increase in montane chaparral cover.

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Photopoints

Photopoint photography comparisons indicate varying degrees of change throughout FDNHS. Each image reflects change differently according to its location within FDNHS. Locations that

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Current vs. Historic (Fig. 4)

The foreground is very similar in both photographs--grama grassland sparsely vegetated with short, clumpy grass. The background shows montane chaparral encroachment. The current photograph shows areas that are somewhat bare, but the montane chaparral encroachment is notable on the slopes of North Ridge Mountain. Nelson (1981) states that the historic photograph was taken in 1875. The historic photograph is documented as AB-6 in the FDNHS museum.

Current vs. 1981

The foreground is very similar here as well. The slopes of North Ridge Mountain show a slight increase in montane chaparral cover.

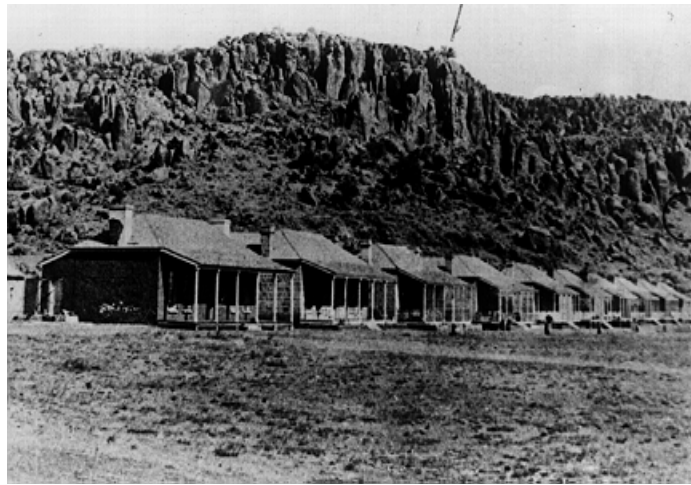
Photopoint 2

Current vs. Historic (Fig. 5)

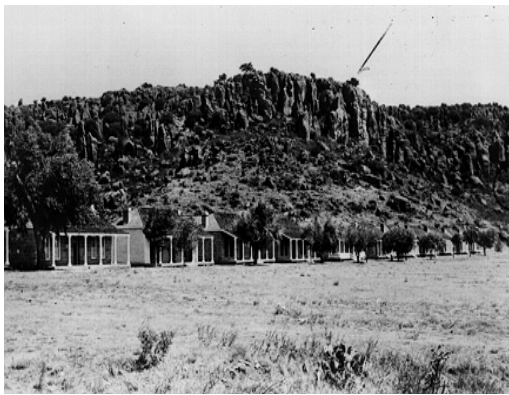
The current photograph shows the similar sparse grama grassland of the parade ground. The slopes of North Ridge have an increase in montane chaparral cover. The bare exposed areas of the slopes correspond roughly to the historic photograph. The historic photograph, documented as HG-4/6, is dated 1875.

Current vs. 1981

The foreground shows similar vegetation. The mixed-desert scrub shown in the 1981 photograph is visible because the photographer in 1981 stood further from officers' row than the historic photographer or the current photographer, therefore capturing the vegetation just south of the parade ground. The current photograph was taken to match the historic photograph and not the 1981 photograph. The parade grounds in both photographs are similar. There is a slight increase in montane chaparral cover on the slopes of North Ridge Mountain.



A. Historic (1875) Photo



B. Nelson Photo (1981)



Current Photo (1997)

Figure 5. Vegetative Comparisons Using Historic and Modern Photographs from FDNHS.

Photopoint 3

Current vs. Historic (Fig. 6)

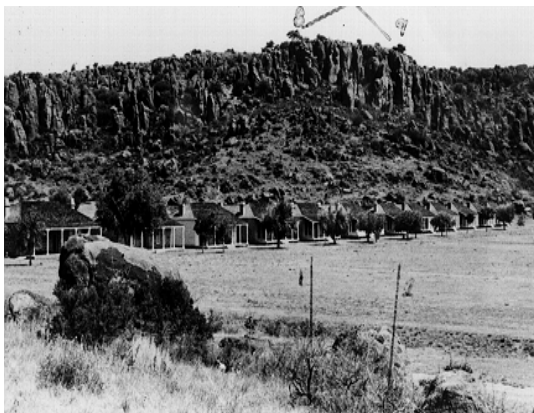
The foreground seems to have more scrub and prickly pear than the historic photograph shows. However, the foreground is somewhat obscured in the historic photograph. The base of the large rock at the left of the photographs is partially covered by a shrub in the current photograph but is essentially bare in the historic photograph. The slopes of North Ridge Mountain show a significant increase in montane chaparral cover and the bare, rocky areas are less extensive. The historic photograph is dated 1871 and is documented as HG-3.

Current vs. 1981

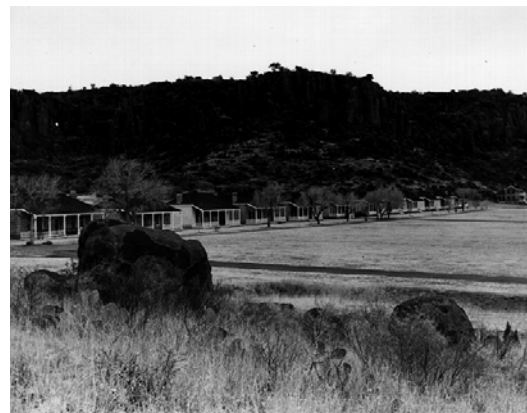
The foreground in the current photograph shows more prickly pear, but the 1981 photograph seems to show more scrub. In addition, the grass cover seems more extensive in the current photograph. The large rock on the left of the photographs is more obscured by scrub in the 1981 photograph than in the current one. The slopes of North Ridge Mountain have slightly increased montane chaparral cover in the current photograph.



A. Historic (1871) Photo



B. Nelson Photo (1981)



C. Current Photo (1997)

Figure 6. Vegetative Comparisons Using Historic and Modern Photographs from FDNHS.

Photopoint 4

Current vs. Historic (Fig. 7)

The foreground shows the parade grounds which are very similar in both photographs. The planted trees in front of officers' row in the current photograph show the efforts of the National Park Service to re-create the plantings done when FDNHS was occupied. The slopes of North Ridge Mountain show an increase in the montane chaparral vegetative community. The bare patches that remain correspond roughly with the bare patches in the historic photograph. The historic photograph is dated 1889 and is catalogued as AB-15.

Current vs. 1981

The foregrounds are very similar, although the 1981 photograph shows some small herbaceous plants in the parade ground. The slopes of North Ridge Mountain show a slight increase in montane chaparral cover.



A. Historic (1889) Photo



B. Nelson Photo (1981)



C. Current Photo (1997)

Figure 7. Vegetative Comparisons Using Historic and Modern Photographs from FDNHS.

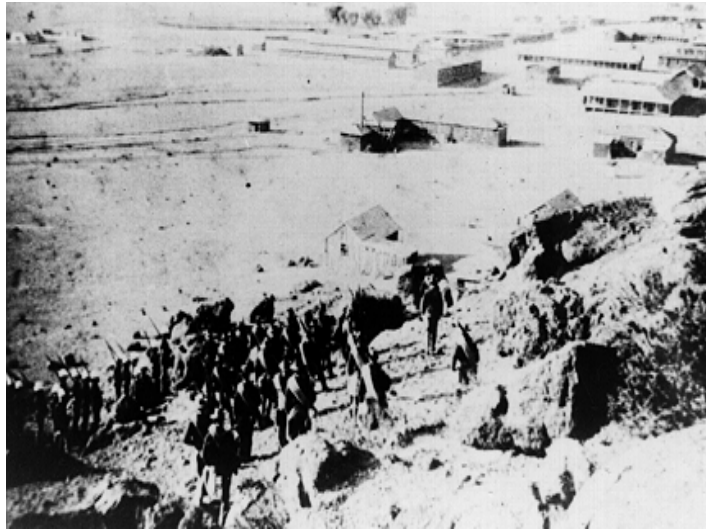
Photopoint 5

Current vs. Historic (Fig. 8)

The foreground shows significant mixed-desert scrub encroachment. The bare ground where the men are walking in the historic photograph is covered with grass and obscured by a large shrub in the current photograph. The background shows the vegetation to be fairly similar in the area of grama grassland mixed with some small scrub. The historic photograph is dated in the 1880's and is documented as AB-11.

Current vs. 1981

The foreground shows a slight increase in the mass of the shrubs. The background shows a similarity in grama grassland formation.



A. Historic (1880's) Photo



B. Nelson Photo (1981)



C. Current Photo (1997)

Figure 8. Vegetative Comparisons Using Historic and Modern Photographs from FDNHS.

Photopoint 6

Current vs. Historic (Fig. 9)

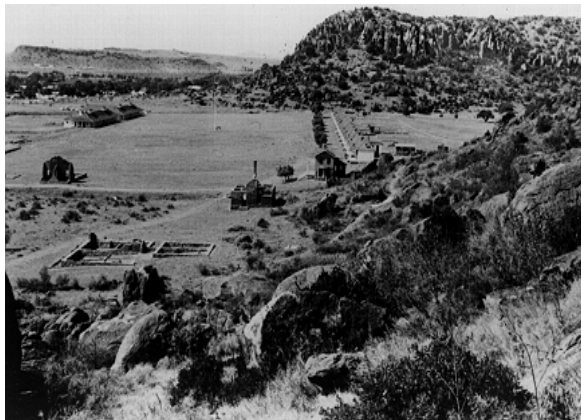
There is much more montane chaparral cover over the rocks than in the historic photograph. The historic photograph shows much less vegetation, including grasses, than the current photograph. Overall, there is much more vegetation, particularly shrubs, covering the area where the historic people were photographed. The historic photograph is dated 1889 and is catalogued as BA-4.

Current vs. 1981

The foreground shows a slight increase in the mass of the shrub cover. In the background, the slopes of Sleeping Lion Mountain show an increase in montane chaparral cover and a decrease in bare ground in the current photograph. The slopes show an overall increase in shrub density and mass in the current photograph, indicating a significant amount of montane chaparral encroachment.



A. Historic (1889) Photo



B. Nelson Photo (1981)



C. Current Photo (1997)

Figure 9. Vegetative Comparisons Using Historic and Modern Photographs from FDNHS.

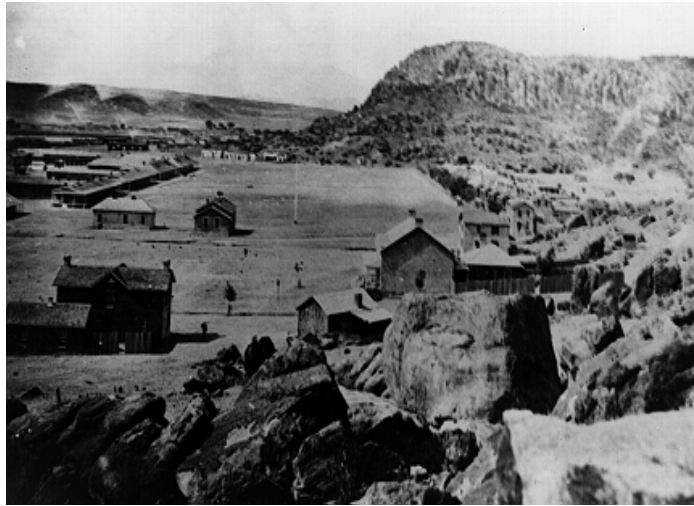
Photopoint 7

Current vs. Historic (Fig. 10)

The foreground shows a significant encroachment of mixed-desert scrub cover. Several of the boulders clearly visible in the historic photograph are obscured by large shrubs in the current photograph. The background shows very similar vegetation across the parade grounds. The slopes of Sleeping Lion Mountain show a significant increase in montane chaparral cover as well. The historic photograph is dated 1886 and is catalogued as HG-14.

Current vs. 1981

The foreground shows a slight increase in mixed-desert scrub cover and a significant increase in shrub mass. The background shows similarity throughout the parade grounds. The slopes of Sleeping Lion Mountain show a slight increase in montane chaparral cover in the current photograph as compared to the 1981 photograph.

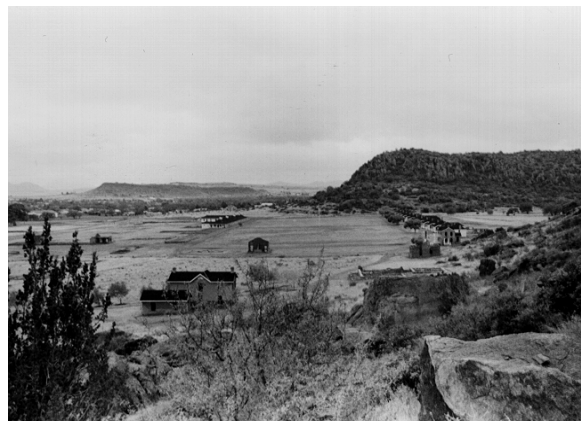


A. Historic (1886)

Photo



B. Nelson Photo (1981)



C. Current Photo (1997)

Figure 10. Vegetative Comparisons Using Historic and Modern Photographs from FDNHS.

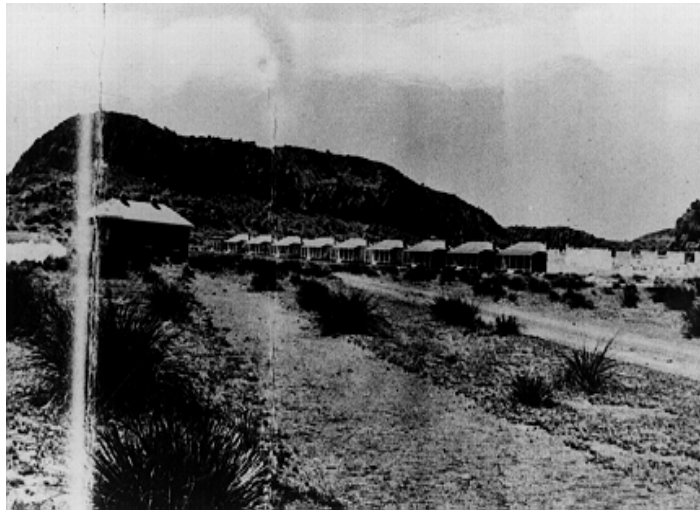
Photopoint 8

Current vs. Historic (Fig. 11)

The foreground of the current photograph shows different vegetation than noted in the historic photograph. There is more grass in the current photograph, but the density of Yucca elata seems the same. The area where the dirt road was previously now shows no signs of the road at all. The background shows evidence of an increase in montane chaparral cover along the slopes of Sleeping Lion Mountain. The historic photograph is dated 1871 and is catalogued as HG-10.

Current vs. 1981

The foreground shows similar vegetation, but in the current photograph there seems to be significantly more grass than in the 1981 photograph. The slopes of Sleeping Lion Mountain show a slight increase in the amount of montane chaparral cover in the current photograph.



A. Historic

(1871) Photo



B. Nelson Photo (1981)



C. Current Photo (1997)

Figure 11. Vegetative Comparisons Using Historic and Modern Photographs from FDNHS.

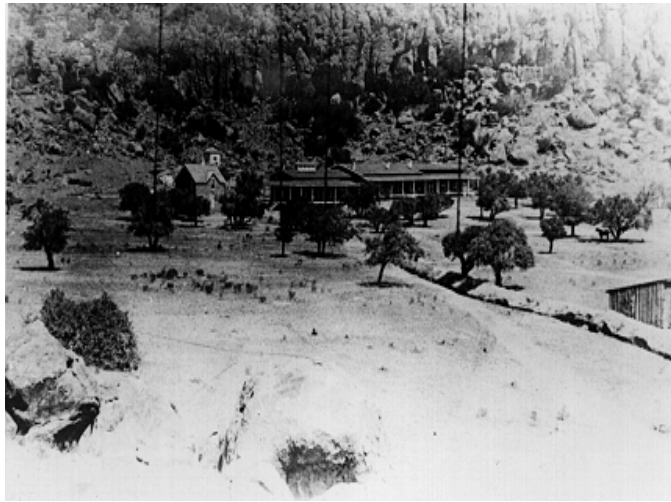
Photopoint 9

Current vs. Historic (Fig. 12)

The foreground is too obscured in the historic photograph to determine vegetation. The middle ground shows growth of trees that occurred historically. While the vegetation is predominantly grama grassland, the historic photograph shows some herbaceous growth in the left middle. The background of the photographs shows an increase in the amount of montane chaparral cover on the slopes of North Ridge Mountain. There is a significant increase in the amount of montane chaparral cover in the current photograph. The bare areas in the historic photograph are non-existent in the current photograph, and the areas with obvious montane chaparral cover seem to show an increase in density and mass. The historic photograph is dated 1887 and is catalogued as HG-21.

Current vs. 1981

The foreground shows roughly similar vegetation, with a slight increase in the mass of the scrub in the current photograph. The middle ground is very similar and seems to show no change. However, the area is maintained by NPS maintenance personnel and is therefore unnaturally preserved as a grama grassland. The slopes of North Ridge Mountain show a slight increase in the amount of montane chaparral cover throughout.



A. Historic (1887) Photo



B. Nelson Photo (1981)



C. Current Photo (1997)

Figure 12. Vegetative Comparisons Using Historic and Modern Photographs from FDNHS.

Photopoint 10

Current vs. Historic (Fig. 13)

The foreground shows some increase in the amount of grass cover in the current photograph. In addition, there is a minimal amount of mixed-desert scrub encroachment. The slope of North Ridge Mountain on the left side of the photograph shows a slight increase in montane chaparral cover. The historic photograph is catalogued as HG-16 and is dated 1887.

Current vs. 1981

The foreground shows the continuation of mixed-desert scrub encroachment into the grama grassland areas from the 1981 to the current photograph. The slopes of North Ridge Mountain are too obscured in the 1981 photograph to make any comparison.



A. Historic (1887) Photo



B. Nelson Photo (1981)



C. Current Photo (1997)

Figure 13. Vegetative Comparisons Using Historic and Modern Photographs from FDNHS.

Photopoint 11

Current vs. Historic (Fig. 14)

The historic photograph shows large rocks and boulders that are almost completely obscured by montane chaparral in the current photograph. There is a significant amount of montane chaparral encroachment in the current photograph. The historic photograph is dated 1891 and is catalogued as AB-16.

Current vs. 1981

The foreground shows similar vegetation. There seems to be a lessening of scrub cover as the large flat rock on the right of the current photograph is not visible in the 1981 photograph. The large white rock in the background center is visible in both photographs. The scrub in the foreground of the current photograph seems taller and denser. The death of a plant near the front of the large flat rock probably occurred allowing for the rock now to be visible.



A. Historic (1891) Photo

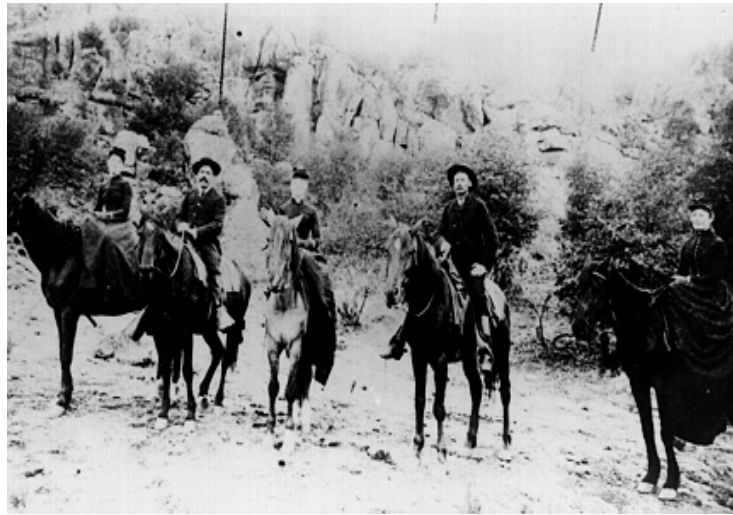


B. Nelson Photo (1981)



C. Current Photo (1997)

Figure 14. Vegetative Comparisons Using Historic and Modern Photographs from FDNHS.



A. Historic

(1880's) Photo



B. Nelson Photo (1981)



C. Current Photo (1997)

Figure 15. Vegetative Comparisons Using Historic and Modern Photographs from FDNHS.

Photopoint 12

Current vs. Historic (Fig. 15)

The foreground shows a significant increase in mixed-desert scrub cover throughout the area that was previously grama grassland in the historic photograph. The background shows an increase in montane chaparral cover to such an extent that the large cliff rocks that are visible in the historic photograph are completely obscured in the current photograph. The historic photograph is dated from the 1880's and is catalogued as AB-18.

Current vs. 1981

The foreground in the current photograph shows a very similar vegetative appearance to that of the 1981 photograph. The mesquite and prickly pear group in the lower right corner of both photographs seems relatively stable. The mixed-desert scrub in the middle ground of the photograph seems very similar. The background shows a slight increase in the amount of montane chaparral cover.



A. Historic (1880's) Photo



B. Nelson Photo (1981)

C. Current Photo (1997)

Figure 15. Vegetative Comparisons Using Historic and Modern Photographs from FDNHS.

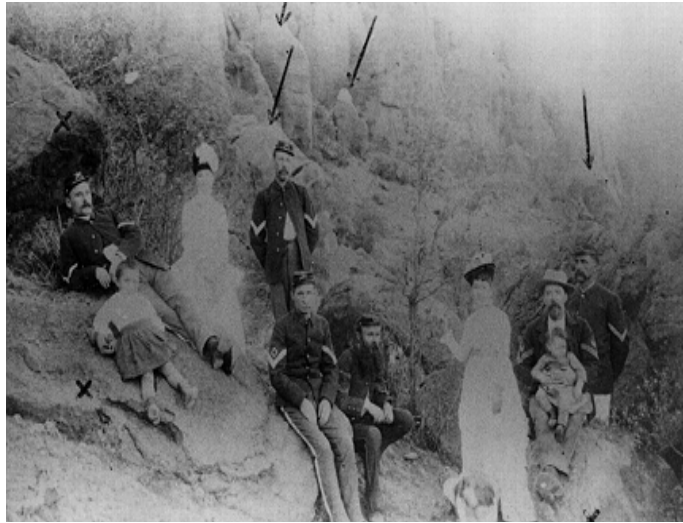
Photopoint 13

Current vs. Historic (Fig. 16)

The foreground shows a significant increase in the montane chaparral cover. The large flat rock on which the officer is reclining is completely obscured by vegetation. The large rock above the officer's head is partially obscured but still recognizable. The background shows an increase in montane chaparral cover as well. The historic photograph is dated from the mid 1880's and is catalogued as AB-4.

Current vs. 1981

The foreground shows a slight increase in montane chaparral cover. The rock displaying the desert patina at the lower right hand corner of the photograph is clearly visible in the 1981 photograph, but is partially obscured in the current one. In addition, the 1981 photograph shows large growth of Thelypodium wrightii, none of which could be found in this area during the current plant survey. The background is difficult to interpret but seems to exhibit a slight increase in montane chaparral cover as compared to the 1981 photograph. In addition, the large oak in the center of the photograph has increased in mass.



A. Historic (1880's) Photo



B. Nelson Photo (1981)



C. Current Photo (1997)

Figure 16. Vegetative Comparisons Using Historic and Modern Photographs from FDNHS.

Photopoint 14

Current vs. Historic (Fig. 17)

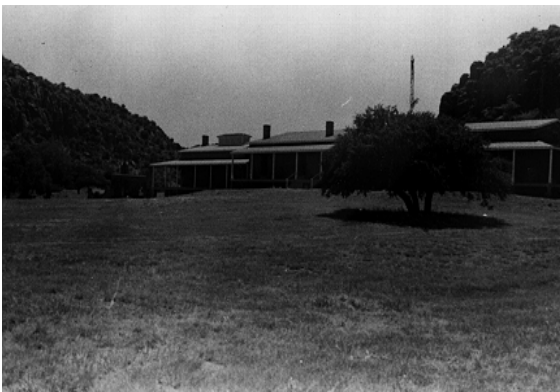
The foreground of the photograph shows a very similar grama grassland formation. The historic tree (indicated by the arrow) remains. The background is too obscured in the historic photograph to be evaluated. The historic photograph is dated from the 1880's and is catalogued as HD-31.

Current vs. Historic

The foreground shows a similarity in grama grassland vegetative community. The historic tree directly in front of the hospital is somewhat more scraggly than in the 1981 photograph. The backgrounds are difficult to interpret but seem relatively similar as well.



A. Historic (1880's) Photo



B. Nelson Photo (1981)

C. Current Photo (1997)

Figure 17. Vegetative Comparisons Using
Historic and Modern Photographs from FDNHS.

Conclusions

Historic Plant List versus Current Plant List

The current plant list represents a change from the historic plant list. Possible reasons for this include the problem of historic locality, introduction of new species, differences between precipitation amounts during historic and current time periods, and a possible mis-identification of species, in addition to other possible causes. The given localities of historic vegetation surveys were very vague in most instances, usually cited as the “Limpio Creek” with no more specific location information. It is possible that the locality given

for historical plants is far enough away historically that the presence of the plant at FDNHS currently is not expected. The fact that new species have been introduced into the region by cattle and human exploits is a given. This is certainly a reason for the presence of some of the more



noxious weeds, such as Johnsongrass. While there are few data regarding precipitation at FDNHS at the time of the historic collections, the existing evidence shows significantly more rainfall in 1885 than in 1996. The likelihood of species mis-identification is possible both on the part of the historic collectors and the current author. Some historic scientific names were not found in current-day literature. It is also likely that some of the historic names may have been inaccurate or that more recent taxonomic studies have resulted in changes to species, classifying those species as the same species. Positive identification of such species is uncertain.

Current Vegetative Communities Vs. Historic Vegetative Communities

Grama grassland

The historic grama grassland community seems to be as extensive as the current community. The areas which it covers are roughly the same in both settings. This is probably because the parade grounds and most of the flat areas are maintained regularly, therefore shrubs have been prevented from encroaching.

Mixed-desert scrub

This community exhibits the greatest degree of change between the two time periods. The slopes of Sleeping Lion and North Ridge Mountains show increased shrub coverage currently, as do the flat area to the east of North Ridge Mountain and the Hospital Canyon areas. This change is possibly evidence of decreased precipitation, and perhaps other factors such as cattle grazing.

Sotol Scrub

The area of the Sotol scrub community is not significantly changed from historic times. In both cases, Sotol scrub is an area that would otherwise probably be termed Grama grassland because of its significant amount of grama grass. The area is currently protected from cattle and is not frequently maintained by park service personnel.

Montane chaparral

The montane chaparral seems to have increased in density over the years. The community is more

wide-spread than it was in years past. This is probably a product of the same factors, such as decreased precipitation and cattle grazing, that led to increased mixed-desert scrub community.

Photopoints

Overall, photopoints show the dramatic changes in vegetative communities between the historic and the modern photographs. The differences between the 1981 and the current photographs are less obvious but are noticeable. The photopoints are remarkable because the vegetative changes can be pinpointed to specific areas. These changes are known to have occurred over a specific time-frame. These observations are more accurate than speculation and more interesting than conjecture.

Causes of Vegetative Change

Changes in vegetative communities are generally attributed to various factors. In the case of arid environments, and particularly desert grasslands, several causes contribute to vegetative change. Domestic livestock grazing is believed to degrade range areas and permit the increase in shrub density as well as allow for the introduction of non-native species into the range through seed dispersal (Cottle, 1931; Humphrey, 1958; Buffington and Herbel, 1965; York and Dick-Pettie, 1969; and Grover and Musick, 1990). Fire suppression effectively removes the force that naturally controlled shrub invasion and maintained stable grasslands. Therefore, fire suppression has a major effect on vegetative composition and change (Humphrey, 1958; and Grover and Musick, 1990). In addition, vegetative changes can be caused by fluctuations in temperature and rainfall. Decreased levels of moisture allow for an influx of shrubs as the grasses begin to decrease (Shreve, 1915; Buffington and Herbel, 1965; and Grover and Musick, 1990).

Factors contributing to the changes of vegetation at FDNHS such as shrub encroachment are similar to those suggested above. Grazing promotes shrub invasion and encroachment. Livestock grazing was documented at FDNHS since the late 1860's and the photopoints show vegetative community differences between that time and now (Nelson, 1981). Fire suppression may be a factor in vegetative change at FDNHS. Nelson (1981) points out that fire can suppress shrub growth and invasion but that fire suppression is not the lone factor contributing to shrub encroachment and invasion. Decreased precipitation is another possible factor in the change of vegetative communities at FDNHS. Precipitation amounts are much lower now than the late 1880's and photopoints show the vegetative community changes during that period.

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Appendix 1

Charles Wright's plant list based on collections made during the years 1850 and 1851 in the general area of FDNHS.

ANACARDIACEAE

Skunkbush (Rhus trilobata Nutt.)

Evergreen sumac (Rhus virens (Lindheimer) *ex* Gray)

APIACEAE

Mexican thistle (Eryngium heterophyllum Engelm.)

ASTERACEAE

Plains ironweed (Vernonia marginata (Torr.) Raf.)

Lemon-scented Pectis (Pectis angustifolia Torr.)

Dotted Gay-feather (Liatris punctata Hook.)

False boneset (Brickellia eupatorioides var. eupatorioides (L.) Shinnery)

Mt. Davis Brickellia (Brickellia parvula Gray)

Havana Boneset (Ageratina havanensis (Kunth.) King & H. E. Robins.)

Shrubby Eupatorium (Eupatorium solidaginifolium Gray)

Running fleabane (Erigeron flagellaris Gray)

Stickbush (Ericameria ericoides (Less.) Jepson)

Bolton Machaeranthera (Machaeranthera boltoniae (Greene) B. L. Turner & Horne)

Gumhead (Selloa corymbosa O. Ktze.)

Downy goldenrod (Solidago petiolaris Ait.)

Gray Goldenrod (Solidago nemoralis Ait.)

Wright Bigelow (Bigelovia wrightii var. hirtella Gray)

Smooth-leaved Aster (Machaeranthera gracilis (Nutt.) Shinnery)

Gray Golden-aster (Heterotheca canescens (DC.) Shinnery)

Leafy Rockdaisy (Perityle rupestris (Gray) Shinnery)

Wright Baccharis (Baccharis wrightii Gray)

**Conyza subdecurrens*

Hoary Blackfoot (Melampodium cinereum DC.)

Lyre-leaf Chocolate Flower (Berlandiera lyrata Benth.)

Mariola (Parthenium incanum Kunth.)

Woolly Sump-weed (Iva dealbata Gray)

Plains Zinnia (Zinnia grandiflora Nutt.)

Multiflowered Goldeneye (Helianthus multiflorus Nutt.)

Plains Coreopsis (Coreopsis tinctoria Nutt.)

Rayless Green-thread (Thelesperma megapotamicum (Spreng.) Kuntze)

Cutleaf Bur Marigold (Bidens tenuisecta Gray)

Shortleaf Jefeia (Jefeia brevifolia (Gray) Stother)

Stinking Marigold (Dyssodia papposa (Vent.) A. S. Hitchc.)

Parralena (Thymophylla pentachaeta var. pentachaeta (DC.) Small)

Thymeleaf Dogweed (Thymophylla aurea var. aurea (Gray) Greene ex Britt.)

Gregg Poreleaf (Porophyllum greggii Gray)

Slender Gaillardia (Gaillardia pinnatifida Torr.)

Bitter Sneezeweed (Helenium amarum var. amarum (Raf.) H. Rock)

Desert Marigold (Baileya multiradiata Harvey & Gray ex Gray)

Silver Wormwood (Artemisia ludoviciana Nutt.)

Fragrant Cudweed (Gnaphalium obtusifolium L.)

White Cudweed (Gnaphalium luteoalbum L.)

Threadleaf Groundsel (Senecio flaccidus var. douglasii (DC.) B.L. Turner & T.M. Barkl.)

Heart-leaf Groundsel (Senecio aureus L.)

Tall Thistle (Cirsium altissimum (L.) Hill)

Wavy-leaf Thistle (Cirsium undulatum (Nutt.) Spreng.)

Brownfoot (Acourtia wrightii (Gray) Reveal & King)

Cutleaf Fleabane (Erigeron divergens Torr. & Gray)

Western Daisy (Astranthum integrifolium ssp. integrifolium (Michx.) Nutt.)

Ashy Goldenrod (Solidago mollis Bartl.)

Dwarf Crownbeard (Verbesina nana (Gray) Robins & Greenm.)

Bluntscale Bahia (Bahia pedata Gray)

Woolly Senecio (Senecio tampicanus DC.)

Plume Thistle (Cirsium virginianum (L.) Michx.)

Blue Lettuce (Lactuca tatarica var. pulchella (Pursh) Breitung)

Wavyleaf Trixis (Trixis angustifolia Gray)

*Stephanomeria minor

*Crepis ambigua

BRASSICACEAE

Auriculate Tumble-Mustard (Coelophragmus auriculatus (Gray) O. E. Schulz)

Prairie Rocket (Erysimum asperum (Nutt.) DC.)

Hairy Hymenolobe (Hymenolobus pubens Gray)

Mountain Mustard (Schoenocrambe linearifolia (Gray) Rollins)

Wright's Thelypody (Thelypodium wrightii Gray)

Diffuse Mustard (Halimolobus diffusa (Gray) O. E. Schulz)

Fendler Bladderpod (Lesquerella fendleri (Gray) S. Wats.)

CAPRIFOLIACEAE

White Honeysuckle (Lonicera albiflora Torr. & Gray)

CARYOPHYLLACEAE

Llomisna (Stellaria prostrata Baldw.)

Lindheimer Nailwort (Paronychia lindheimeri Engelm. ex Gray)

CRASSULACEAE

Live Forever (Echeveria strictiflora Gray)

CUCURBITACEAE

Melon-loco (Apodanthera undulata Gray)

FABACEAE

James Dalea (Dalea jamesii (Torr.) Torr. & Gray)

Woolly Locoweed (Astragalus mollissimus Torr.)

Silky Sophora (Sophora nuttalliana B. L. Turner)

Two-leaved Senna (Senna bauhinoides (Gray) Irwin & Barneby)

Little-leaf Lead-tree (Leucaena retusa Benth.)

**Cercasus* (*Microserasus*) *capollin*

Texas Snoutbean (Rhynchosia senna var. texana (Torr. & Gray) M. C. Johnston)

Radiant Cologania (Cologania pulchella Kunth)

Longleaf Cologania (Cologania angustifolia Kunth)

Maculate Phaseolus (Phaseolus maculatus Scheele)

Wright Milkpea (Galactia wrightii Gray)

Shapeless Kidneywood (Eysenhardtia amorphoides Kunth)

Black Dalea (Dalea frutescens Gray)

Dwarf Dalea (Dalea nana var. canescens Kearney & Peebles)

New Mexico Dalea (Dalea mollis Benth.)

Bearded Dalea (Dalea pogonathera Gray)

Purple Dalea (Dalea lasiathera Gray)

Deer Vetch (Lotus rigidus (Benth.) Greene)

Camote del Monte (Peteria scoparia Gray)

Hog Potato (Hoffmannseggia glauca (Ortega) Eifert)

Catclaw Mimosa (Mimosa aculeaticarpa var. biuncifera (Benth.) Barneby)

Gatuna (Mimosa dysocarpa Benth.)

Dwarf Fairy Duster (Calliandra humilis Benth.)

Cooley Bundleflower (Desmanthus cooleyi (Eat.) Trel.)

White Thorn Acacia (Acacia constricta Benth.)

KRAMERIACEAE

Erect Krameria (Krameria erecta Willd. ex J. A. Schultes)

LINACEAE

Wild Blue Flax (Linum perenne L.)

LOASACEAE

Stinging Cevallia (Cevallia sinuata Lag.)

MALPHIGIACEAE

Longflowered Asp Head (Aspicarpa longipes Gray)

MALVACEAE

Elliott Sida (Sida elliotti Torr. & Gray)

Littleleaf Abutilon (Abutilon parvulum Gary)

Checker Mallow (Sidalcea malviflora (DC.) Gray *ex* Benth.)

Scarlet Mallow (Sphaeralcea coccinea ssp. coccinea (Nutt.) Rydb.)

ONAGRACEAE

Shortpod Evening Primrose (Oenothera brachycarpa Gray)

Tube-flowered Primrose (Calylophus tubicola (Gray) Raven)

Wavy-leaf Gaura (Gaura sinuata Nutt. *ex* Ser.)

Evening Primrose (Oenothera biennis L.)

Scarlet Gaura (Gaura coccinea Nutt. *ex* Pursh)

Hairy Gaura (Gaura villosa Torr.)

OXALIDACEAE

Radishroot Oxalis (Oxalis albicans ssp. albicans Kunth.)

POLYGALACEAE

Shrubby Milkwort (Polygala lindheimeri Gray)

White Milkwort (Polygala alba Nutt.)

Hairy Milkwort (Polygala puberula Andersson)

PORTULACACEAE

Kiss-me-quick (Portulaca pilosa L.)

Flame Flower (Talinum aurantiacum Engelm.)

Pink Baby-breath (Talinum paniculatum var. paniculatum (Jacq.) Gaertn.)

RHAMNACEAE

Javelina Bush (Condalia ericoides (Gray) M. C. Johnston)

Junco (Adolphia infesta (Kunth.) Meisn.)

ROSACEAE

Smooth Rose (Rosa blanda Ait.)

RANUNCULACEAE

Texas Virgin's Bower (Clematis drummondii Torr. & Gray)

Leather Flower (Clematis pitcheri Torr. & Gray)

Blue Larkspur (Delphinium carolinianum ssp. carolinianum Walt.)

Hispid Buttercup (Ranunculus hispidus var. nitidus (Chapman) T. Duncan)

Showy Buttercup (Ranunculus macranthus Scheele)

RUBIACEAE

Bracted Bedstraw (Galium microphyllum Gray)

Wright Bedstraw (Galium wrightii Gray)

Hairy Bouvardia (Bouvardia hirtella (DC) Rothr.)

Mat Bluets (Houstonia humifusa (Gray) Gray)

SAXIFRAGACEAE

Thymeleaf Mockorange (Philadelphus serpyllifolius Gray)

STERCULIACEAE

Warty Ayenia (Ayenia insulicola Cristobal)

VIOLACEAE

Linearleaf Nodviolet (Hybanthus linearifolius (Vahl) Urban)

VITACEAE

Mountain Grape (Vitis rupestris Scheele)

Appendix 2

John Torrey's plant list. Plants were collected during 1859.

AGAVACEAE

Spanish Bayonet (Yucca baccata Torr.)

AIZOACEAE

*Trianthema monogyna L.

AMARANTHACEAE

Shrubby Tidestromia (Tidestromia suffruticosa (Torr.) Standl.)

Cotton-weed (Froelichia floridana (Nutt.) Moq.)

ANACARDIACEAE

Prairie Sumac (Rhus lanceolata (Gray) Britt.)

APIACEAE

Common Selinum (Selinum berula (Krause) Sturm)

*Isolepis capillaris Roem & Schultes

Spotted Cowbane (Cicuta maculata L.)

ASCLEPIADACEAE

Pearl Milkvine (Matelea producta (Torr.) Woods.)

Wavyleaf Matelea (Matelea parviflora (Torr.) Woods.)

Bilobed Twinevine (Sarcostemma bilobum Hook. & Arn.)

Broadleaf Milkweed (Asclepias latifolia (Torr.) Raf.)

ASTERACEAE

Dotted Gay-feather (Liatris punctata Hook.)

Western Daisy (Astranthium integrifolium ssp. integrifolium (Michx.) Nutt.)

Leafy Rockdaisy (Perityle rupestris var. rupestris (Gray) Shinnars)

Maximilian's Sunflower (Helianthus maximiliani Schrad.)

Calliope Coreopsis (Coreopsis calliopsidea (DC.) Gray)

Rayless Green-thread (Thelesperma megapotamicum (Spreng.) Kuntze)

Bidelow Beggar-ticks (Bidens bigelovii Gray)

Thymeleaf Dogweed (Thymophylla aurea var. aurea (Gray) Greene ex Britt.)

Damianita (Chrysactinia mexicana Gray)

Bluntscale Bahia (Bahia pedata Gray)

Yerba Raton (Bahia bigelovii Gray)

Woolly Senecio (Senecio tampicanus DC.)

Wavy-leaf Thistle (Cirsium undulatum (Nutt.) Spreng.)

Brownfoot (Acourtia wrightii (Gray) Reveal & King)

Fineleaf Heterosperma (Heterospermum pinnatum Cav.)

*Gnaphalium sprengelii Hook. & Arn.

*Nothochlaenae cretacea Liebmann

BERBERIDACEAE

Agarito (Mahonia trifoliata (Moric.) Fedde)

BRASSICACEAE

Brazos Rockcress (Arabis petiolaris (Gray) Gray)

Diffuse Mustard (Halimolobos diffusa (Gray) O. E. Schulz)

CAPRIFOLIACEAE

White Honeysuckle (Lonicera albiflora Torr. & Gray)

COMMELINACEAE

Virginia Spiderwort (Tradescantia virginiana L.)

CONVOLVULACEAE

Hairy Morning Glory (Ipomoea pubescens Lam.)

CUCURBITACEAE

Slimlobe Globeberry (Ibervillea tenuisecta (Gray) Small)

CYPERACEAE

Bottlebrush Sedge (Carex hystericina Muhl. ex Willd.)

*Cyperus rupens Ell.

*Cladium effusum Torr

EUPHORBIACEAE

Forked Spurge (Euphorbia bifurcata Engelm.)

Branching Noseburn (Tragia ramosa Torr.)

FABACEAE

Maculate Bean (Phaseolus maculatus Scheele)

Golden Dalea (Dalea aurea Nutt. ex Pursh.)

James Dalea (Dalea jamesii (Torr.) Torr. & Gray)

Glandleaf Dalea (Dalea lachnostachys Gray)

Graham Tickclover (Desmodium grahamii Gray)

Wright Tickclover (Desmodium psilophyllum Schlecht.)

Dwarf Fairy Duster (Calliandra humilis var. humilis Benth.)

FAGACEAE

Bur Oak (Quercus coccinea var. macrocarpa DC.)

Emory's Oak (Quercus emoryi Torr.)

JUGLANDACEAE

Texas Walnut (Juglans macrocarpa var. macrocarpa Berl.)

JUNCACEAE

Weak Rush (Juncus debilis Gray)

LAMIACEAE

Veiny Hedeoma (Hedeoma plicata Torr.)

LEMNACEAE

Duckweed (Lemna polyrrhiza Grisebach.)

LINACEAE

Wild Blue Flax (Linum perenne L.)

Rock Flax (Linum rupestre (Gray) Engelm. ex Gray)

Tufted Flax (Linum imbricatum (Raf.) Shinnery)

LYTHRACEAE

*Ammannia wrightii Gray

MALPHIGIACEAE

Slender Propellar-bush (Janusia gracilis Gray)

Longflowered Asp Head (Aspicarpa longipes Gray)

MALVACEAE

Indian Mallow (Abutilon holosericeum Scheele)

Checker Mallow (Sidalcea malviflora (DC.) Gray *ex* Benth.)

Elliott Sida (Sida elliotii Torr. & Gray)

Linearleaf Anoda (Anoda lanceolata Hook. & Arn.)

MARTYNIACEAE

Desert Unicorn-Plant (Proboscidea althaeifolia (Benth.) Dcne.)

**Martynia violacea* Engelm.

NAIADACEAE

Illinois Pondweed (Potamogeton illinoensis Morong)

NYCTAGINACEAE

Manyleaved Four O'Clock (Mirabilis aggregatus (Ortega) Cav.)

**Mulgedium pulchellum* Nutt.

Hairy Four O'Clock (Mirabilis hirsuta (Pursh) MacM.)

OLEACEAE

Desert-olive (Forestiera pubescens var. pubescens Nutt.)

ONAGRACEAE

Purple-leaf Willow Herb (Epilobium coloratum Biehler)

Tubeflowered Primrose (Calylophus tubicola (Gray) Raven)

Floating Water-primrose (Ludwigia repens J. R. Forst.)

POLYGONACEAE

Heart's Ease (Polygonum persicaria L.)

Tufted Cottonflower (Guilleminea densa (Humb. & Bonpl. *ex* Willd.) Moq.)

PONTEDERIACEAE

Duck-salad (Heteranthera limosa (Sw.) Willd.)

PORTULACACEAE

Kiss-me-quick (Portulaca pilosa L.)

PRIMULACEAE

Brookweed (Samolus valerandi L.)

RANUNCULACEAE

Leather Flower (Clematis pitcheri Torr. & Gray)

Texas Virgin's Bower (Clematis drummondii Torr. & Gray)

Large Buttercup (Ranunculus macranthus Scheele)

ROSACEAE

*Prunin capollin DC.

Smooth Rose (Rosa blanda Ait.)

SAXIFRAGACEAE

Thymeleaf Mockorange (Philadelphus serpyllifolius Gray)

SCROPHULARIACEAE

Chamaedryoid Waterhyssop (Bacopa chamaedryoides (Wettst) Engl. & Prantl)

James Penstemon (Penstemon jamesii Benth.)

Wright Penstemon (Penstemon wrightii Hook.)

Limpia Seymeria (Seymeria scabra Gray)

Woolly Paintbrush (Castilleja lanata Gray)

Wavyleaf Paintbrush (Castilleja angustifolia (Nutt.) G. Don)

SOLANACEAE

American Black Nightshade (Solanum americanum P. Mill)

Melon-leaf Nightshade (Solanum citrullifolium A. Braun)

URTICACEAE

Stinging Nettle (Urtica dioica ssp. gracilis (Ait.) Seland.)

Appendix 3

George Engelmann's cactus list. Collected on the same trip as John Torrey in 1859.

CACTACEAE

Long-tubed Coryphantha (Coryphantha scheeri var. scheeri (Muehlenpfordt) L. Benson)

*Echinocactus longehamatus var. brevispinus

Green Pitaya (Echinocereus viridiflorus Engelm.)

Engelmann Prickly Pear (Opuntia engelmanni Salm.-Dyck)

Purple Prickly Pear (Opuntia macrocentra Engelm.)

Pott Prickly Pear (Opuntia macrorhiza var. pottsii (Salm-Dyck) L. Benson)

Wright Prickly Pear (Opuntia wrightii Engelm.)

Appendix 4

Valory Havard's plant list. Plants were collected in 1885. Locations were given as a very general Western Texas.

ACERACEAE

Sugar Maple (Acer grandidentatum Nutt.)

AGAVACEAE

Spanish Bayonet (Yucca baccata Torr.)

Narrowleaf Yucca (Yucca angustifolia Pursh.)

Texas Sotol (Dasyilirion texanum Scheele)

Texas Sacahuiste (Nolina texana S. Wats.)

Wislizen Agave (Agave wislizenii Berger)

ANACARDIACEAE

Dwarf Sumac (Rhus copallinum L.)

Prairie Sumac (Rhus lanceolata (Gray) Britt.)

Evergreen Sumac (Rhus virens Lindheimer ex Gray)

Skunkbush (Rhus trilobata var. trilobata Nutt.)

Desert Sumac (Rhus microphylla Engelm. ex Gray)

Poison Oak (Toxicodendron pubescens P. Mill)

ASTERACEAE

Sunflower (Helianthus annuus L.)

Rosinweed (Grindelia squarrosa (Pursh) Dunal)

Engelmann's Daisy (Engelmannia pinnatifida Gray ex Nutt.)

Damianita (Chrysactinia mexicana Gray)

Crownseed Pectis (Pectis angustifolia Torr.)

Longstalk Pectis (Pectis longipes Gray)

Manybristle Pectis (Pectis papposa Harvey & Gray)

BERBERIDACEAE

Agarito (Mahonia trifoliata (Moric.) Fedde)

BIGNONIACEAE

Desert Willow (Chilopsis linearis (Cav.) Sweet)

BRASSICACEAE

Watercress (Rorippa nasturtium-aquaticum (L.) Hayek)

CACTACEAE

Spinemound Echinocereus (Echinocereus stramineus (Engelm.) F. Seitz)

Heyder Mammillaria (Mammillaria heyderi var. meicantha (Engelm.) L. Benson)

Tubercle Escobaria (Escobaria tuberculosa (Engelm.) Britt. & Rose)

Engelmann Prickly Pear (Opuntia engelmanni Salm-Dyck)

Livingrock (Ariocarpus fissuratus (Engelm.) K. Schum.)

*Krascheninnikovia lanata (Pursh) Guldenstaedt

CONVOLVULACEAE

Jalapa Wild Morning Glory (Ipomoea jalapa Michx.)

CUCURBITACEAE

Buffalo Gourd (Cucurbita foetidissima H.B.K.)

Lindheimer Globberberry (Ibervillea lindheimeri (Gray) Greene)

CUPRESSACEAE

Western Juniper (Juniperus occidentalis Hook.)

EBENACEAE

Texas Persimmon (Diospyros texana Scheele)

EPHEDRACEAE

Clapweed (Ephedra antisyphilitica Berl. ex C.A. Mey)

Long-leaf Ephedra (Ephedra trifurca Torr. ex S. Wats.)

ERICACEAE

Madrone (Arbutus xalapensis Kunth)

EUPHORBIACEAE

White-margin Spurge (Chamaesyce albomarginata (Torr. & Gray) Small)

Slimseed Spurge (Chamaesyce strictospora (Engelm.) Small)

Ashy Spurge (Chamaesyce cinerascens (Engelm.) Small)

Leatherweed Croton (Croton pottsii var. pottsii (Klotzsch) Muell.-Arg.)

Lindheimer Copperleaf (Acalypha lindheimeri Muell.-Arg.)

FABACEAE

Catclaw (Acacia roemeriana Scheele)

Catclaw Mimosa (Mimosa aculeaticarpa var. biuncifera (Benth.) Barneby)

Texas Mountain Laurel (Sophora secundiflora (Ortgea) Lag. ex DC.

Retuse Bean (Phaseolus retusus Benth.)

Breadroot (Pediomelum esculentum (Pursh) Rydb.)

Tight Rushpea (Hoffmanseggia stricta Benth.)

Camote Del Monte (Peteria scoparia Gray)

Woolly Locoweed (Astragalus mollissimus Torr)

FAGACEAE

Gray Oak (Quercus grisea Liebm.)

Emory's Oak (Quercus emoryi Torr.)

FOUQUIERIACEAE

Ocotillo (Fouquieria splendens Engelm.)

JUGLANDACEAE

Little Walnut (Juglans microcarpa var. microcarpa Berl.)

KOEBERLINIACEAE

Allthorn (Koeberlinia spinosa Zucc.)

KRAMERIACEAE

Trailing Krameria (Krameria lanceolata Torr.)

Erect Krameria (Krameria erecta Willd. ex J.A. Schultes)

Range Krameria (Krameria parvifolia var. ramosissima Gray)

Woolly Krameria (Krameria canescens Willd.)

MARTYNIACEAE

Fragrant Devil's Claw (Proboscidea louisianica ssp. fragrans (Lindl.) Bretting)

MORACEAE

Texas Mulberry (Morus microphylla Buckl.)

OLEACEAE

Berlandier Green Ash (Fraxinus viridis var. berlandieriana (DC.) Torr.)

PHYTOLACCACEAE

Rouge-plant (Rivina humilis L.)

PORTULACACEAE

Orange Flameflower (Talinum aurantiacum Engelm.)

RHAMNACEAE

Lotebush (Ziziphus obtusifolia (Hook ex Torr. & Gray) Gray)

Brasil (Condalia hookeri var. hookeri M.C. Johnston)

ROSACEAE

*Prunus capollin

RUTACEAE

Hop-tree (Ptelea trifoliata L.)

SALICACEAE

Eastern Cottonwood (Populus deltoides ssp. monilifera (Ait.) Eckenwalder)

SAPINDACEAE

Mexican Buckeye (Ungnadia speciosa Endl.)

Jaboncillo Soapberry (Sapindus saponaria var. saponaria L.)

SAXIFRAGACEAE

Sticky Currant (Ribes viscosissimum Pursh)

SOLANACEAE

Silver-leaf Nightshade (Solanum eleagnifolium Cav.)

ULMACEAE

Hackberry (Celtis occidentalis L.)

Desert Hackberry (Celtis pallida Torr.)

VERBENACEAE

Common Bee Brush (Aloysia gratissima var. gratissima (Gillies & Hook.) Troncoso)

VITACEAE

Frost Grape (Vitis riparia Michx.)

ZYGOPHYLLACEAE

Creosotebush (*Larrea tridentata* (DC.) Cov.)

Appendix 5

James Nelson's plant list. The list only includes species not previously mentioned by earlier collectors. The list was compiled in 1981.

ASTERACEAE

California Brickellia (Brickellia californica (Torr. & Gray) Gray)

POACEAE

Western Wheatgrass (Pascopyrum smithii (Rydb.) A. Love)

Wooton's Three-awn (Aristida pansa Woot. & Standl.)

Aparejo Grass (Muhlenbergia utilis (Torr.) A.S. Hitchc.

Alkali Sacaton (Sporobolus airoides (Torr.) Torr.)

Appendix 6

The plant list based on the contents of the herbarium at FDNHS. Collections for the herbarium were primarily made in the 1970's, with some minor additions added later.

ACANTHACEAE

Spreading Silverleaf (Dyschoriste decumbens (Gray) Kuntze)

Snake-herb (Dyschoriste linearis (Torr. & Gray) Kuntze)

Hairy Tubetongue (Siphonoglossa pilosella (Nees) Torr.)

AMARANTHACEAE

Warnock Amaranth (Amaranthus crassipes Schlecht)

Arizona Snakecotton (Froelichia arizonica Thornb. ex Standl.)

Stanley Bloodleaf (Iresine heterophylla Standl.)

ANACARDIACEAE

Skunk Bush (Rhus trilobata Nutt.)

Evergreen Sumac (Rhus virens Lindheimer ex Gray)

APIACEAE

Mexican Thistle (Eryngium heterophyllum Engelm.)

APOCYNACEAE

Dogbane (Telosiphonia macrosiphon (Torr.) Henrickson)

ARISTOLOCHIACEAE

Wright Dutchmanspipe (Aristolochia wrightii Seem.)

ASCLEPIADACEAE

Shortcrown Milkweed (Asclepias brachystephana Engelm. ex Torr.)

Whorled Milkweed (Asclepias subverticillata (Gray) Vail)

Texas Milkweed (Asclepias texana Heller)

Pearl Milkvine (Matelea producta (Torr.) Woods.)

ASTERACEAE

Carruth Sagewort (Artemisia carruthii Wood ex Carruth.)

Silver Wormwood (Artemisia ludoviciana Nutt.)

Robust Westerndaisy (Astranthium robustum (Shinners) De Jong))

Seep-Willow (Baccharis salicifolia (Ruiz & Pavon) Pers.)

Yerba de Pasmó (Baccharis pteronioides DC.)

Bigelow Bahia (Bahia bigelovii Gray)

Lyre-Leaf Chocolate Flower (Berlandiera lyrata Benth.)

Fewflower Beggarticks (Bidens leptcephala Sherff.)

Wavy-leaf Thistle (Cirsium undulatum (Nutt.) Spreng)

Coulter Conyza (Laennecia coulteri (Gray) Nelson)

Plains Fleabane (Erigeron modestus Gray)

Palmleaf Thoroughwort (Conoclinium dissectum Gray)

Tarbush (Flourensia cernua DC.)

Slender Gaillardia (Gaillardia pinnatifida Torr.)

Sweet Gaillardia (Gaillardia suavis (Gray & Engelm.) Britt. & Rusby)

Cottonbatting Cudweed (Gnaphalium stramineum Kunth)

Basin Sneezeweed (Helenium amarum var. badium (Gray ex S. Wats.) Waterfall)

Yellow Hawkweed (Hieracium fendleri Schultz-Bip)

Stemless Bitterweed (Tetraneuris acaulis var. acaulis (Pursh) Greene)

Dotted Gay-feather (Liatris punctata Hook.)

Desert Wire-Lettuce (Stephanomeria pauciflora (Torr.) A. Nelson)

Texas Skeletonplant (Lygodesmia texana (Torr. & Gray) Greene)

Pinnate Aster (Machaeranthera pinnatifida (Hook.) Shinnery)

Lyreleaf Parthenium (Parthenium confertum Gray)

Brownfoot (Acourtia wrightii (Gray) Reveal & King)

Leafy Rockdaisy (Perityle rupestris (Gray) Shinnery)

Ruderal Poreleaf (Porophyllum ruderal (Jacq.) Cass.)

Mexican Hat (Ratibida columnifera (Nutt.) Woot. & Standl.)

Thread-leaf Groundsel (Senecio flaccidus var. flaccidus Less.)

Awnless Bushsunflower (Simsia calva (Engelm. & Gray) Gray)

Rayless Greenthread (Thelesperma megapotamicum (Spreng.) Kuntze)

American Trixis (Trixis californica Kellogg)

Golden-crown Daisy (Verbesina encelioides (Cav.) Benth. & Hook. f. ex Gray)

Plains Ironweed (Vernonia marginata (Torr.) Raf.)

Dentateleaf Goldeneye (Viguiera dentata (Cav.) Spreng.)

Common Broomweed (Amphiachyris dracunculoides (DC.) Nutt.)

Sticky Snakeweed (Gymnosperma glutinosum (Spreng.) Less.)

Broomweed (Gutierrezia sarothrae (Pursh) Britt. & Rusby)

BERBERIDACEAE

Agarito (Mahonia trifoliata (Moric.) Fedde)

BIGNONIACEAE

Yellow Bells (Tecoma stans (L.) Juss.)

BRASSICACEAE

Virginia Pepper-weed (Lepidium virginicum L.)

Fendler Bladderpod (Lesquerella fendleri (Gray) S. Wats.)

True Bladderpod (Lesquerella valida Greene)

Mountain Mustard (Schoenocrambe linearifolia (Gray) Rollins)

Wright Thelypody (Thelypodium wrightii Gray)

CACTACEAE

Grassland Prickly Pear (Opuntia macrorhiza Engelm.)

CAPRIFOLIACEAE

White Honeysuckle (Lonicera albiflora Torr. & Gray)

CHENOPODIACEAE

Four-wing Saltbush (Atriplex canescens (Pursh) Nutt.)

Hyssop Bassia (Bassia hyssopifolia (Pallas) Volk.)

Fremont Goosefoot (Chenopodium fremontii S. Wats.)

COMMELINACEAE

Birdbill Dayflower (Commelina dianthifolia Delile)

Prairie Spiderwort (Tradescantia occidentalis (Britt.) Smyth)

CONVOLVULACEAE

Texas Bindweed (Convolvulus equitans Benth.)

Silver Ponyfoot (Dichondra argentea Humb. & Bonpl. ex Willd.)

New Mexico Ponyfoot (Dichondra brachypoda Woot. & Standl.)

Silky Evolvulus (Evolvulus sericeus Sw.)

Ivy Morning Glory (Ipomoea cristulata Hallier f.)

Blue Morning Glory (Ipomoea lindheimeri Gray)

CUPRESSACEAE

Alligator Juniper (Juniperus deppeana Steud.)

One-seeded Juniper (Juniperus monosperma (Engelm.) Sarg.)

CYPERACEAE

Taperleaf Flatsedge (Cyperus acuminatus Torr. & Hook. ex Torr.)

EPHEDRACEAE

Vine Ephedra (Ephedra antisiphilitica Berl. ex S. Wats.)

Long-leaf Ephedra (Ephedra trifurca Torr. ex S. Wats.)

EUPHORBIACEAE

Lindheimer Copperleaf (Acalypha lindheimeri Muell.-Arg.)

New Mexico Copperleaf (Acalypha neomexicana Muell.-Arg.)

Leatherweed Croton (Croton pottsii (Klotzsch) Muell.-Arg.)

Scented Croton (Croton suaveolens Torr.)

Toothed Spurge (Euphorbia dentata Michx.)

Hyssopleaf Spurge (Chamaesyce hyssopifolia (L.) Small)

FABACEAE

White-Thorn Acacia (Acacia constricta Benth.)

Texas Fern Acacia (Acacia angustissima var. texensis (Torr. & Gray) Isely)

Emory Locoweed (Astragalus emoryanus (Rydb.) Cory)

Woolly Locoweed (Astragalus mollissimus Torr.)

Bird-of-paradise (Caesalpinia gilliesii (Hook.) Wallich ex D. Dietr.)

Lindheimer Senna (Senna lindheimeriana (Scheele) Irwin & Barneby)

Roemer Senna (Senna roemeriana (Scheele) Irwin & Barneby)

Pale Cologania (Cologania pallida Rose)

Black Dalea (Dalea frutescens Gray)

Dwarf Dalea (Dalea nana Torr. ex Gray)

Hog-potato (Hoffmanseggia glauca (Ortega) Eifert)

Deer Vetch (Lotus plebeius (Brand) Barneby)

Catclaw Mimosa (Mimosa aculeaticarpa var. biuncifera (Benth.) Barneby)

Velvetpod Mimosa (Mimosa dysocarpa Benth.)

Honey Mesquite (Prosopis glandulosa Torr.)

Texas Mountain Laurel (Sophora secundiflora (Ortega) Lag. ex DC.)

FAGACEAE

Emory Oak (Quercus emoryi Torr.)

Graves Oak (Quercus gravesii Sudworth)

Gray Oak (Quercus grisea Liebm.)

Sandpaper Oak (Quercus pungens Liebm.)

FUMARIACEAE

Golden Corydalis (Corydalis aurea Willd.)

JUGLANDACEAE

Little Walnut (Juglans microcarpa Berl.)

KOEBERLINIACEAE

Allthorn (Koeberlinia spinosa Zucc.)

LAMIACEAE

Rock Betony (Stachys bigelovii Gray)

LOASACEAE

Stinging Cevallia (Cevallia sinuata Lag.)

Stick-leaf (Mentzelia oligosperma Nutt. ex Sims)

Yellow Mentzelia (Mentzelia pumila Nutt. ex Torr. & Gray)

LOGANIACEAE

Escobilla Butterflybush (Buddleja scordioides Kunth)

MALVACEAE

Indian Mallow (Abutilon incanum (Link) Sweet)

Wright Abutilon (Abutilon wrightii Gray)

Abutilonleaf Sida (Sida abutifolia P. Mill.)

Alkali Mallow (Malvella leprosa (Ortega) Krapov.)

New Mexico Sida (Sida neomexicana Gray)

MARTYNIACEAE

Devil's Claw (Proboscidea louisianica (Mill.) Thell.)

MORACEAE

Texas Mulberry (Morus microphylla Buckl.)

NYCTAGINACEAE

Littleleaf Moonpod (Selinocarpus parvifolius (Torr.) Standl.)

OLEACEAE

Showy Menodora (Menodora longiflora Gray)

ONAGRACEAE

Shortpod Evening Primrose (Oenothera brachycarpa Gray)

OROBANCHACEAE

Mexican Squawroot (Conopholis alpina var. mexicana (Gray ex S. Wats.) Haynes)

PAPAVERACEAE

Deeplobed Prickly Poppy (Argemone squarrosa Greene)

PHYTOLACCACEAE

Rouge-plant (Rivina humilis L.)

POACEAE

Hook Threeawn (Aristida ternipes var. hamulosa (Henr.) Trent)

Red Threeawn (Aristida purpurea var. longiseta (Steud.) Vasey)

Wooton Threeawn (Aristida pansa Woot. & Standl.)

Sixweeks Grama (Bouteloua barbata Lag.)

Sprucetop Grama (Bouteloua chondrosioides (Kunth) Benth. ex S. Wats.)

Sideoats Grama (Bouteloua curtipendula (Michx.) Torr.)

Blue Grama (Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths)

Rescuegrass (Bromus catharticus Vahl)

Grassbur (Cenchrus carolinianus Walt.)

Windmillgrass (Chloris verticillata Nutt.)

Showy Chloris (Chloris virgata Sw.)

Mediterranean Lovegrass (Eragrostis barrelieri Daveau)

Plains Lovegrass (Eragrostis intermedia A. S. Hitchc.)

Tanglehead (Heteropogon contortus (L.) Beauv. ex Roemer & J. A. Schultes)

Green Sprangletop (Leptochloa dubia (Kunth) Nees)

Wolftail (Lycurus phleoides Kunth)

Bullgrass (Muhlenbergia emersleyi Vasey)

Creeping Muhly (Muhlenbergia repens (J. Presl.) A. S. Hitchc.)

Aparejogress (Muhlenbergia utilis (Torr.) A. S. Hitchc.)

Vine Mesquite (Panicum obtusum Kunth)

Texas Bluestem (Schizachyrium cirratum (Hack.) Woot. & Standl.)

Grisebach Bristlegrass (Setaria grisebachii Fourn.)

Plains Bristlegrass (Setaria leucopila (Scribn. & Merr.) K. Schum.)

Yellow Bristlegrass (Setaria pumila (Poir.) Roemer & J.A. Schultes)

Alkali Sacaton (Sporobolus airoides (Torr.) Torr.)

Sand Dropseed (Sporobolus cryptandrus (Torr.) Gray)

California Witchgrass (Digitaria californica (Benth.) Henr.)

POLEMONIACEAE

Prickleleaf Gilia (Gilia rigidula Benth.)

Skyrocket (Ipomopsis aggregata (Pursh) V. Grant)

White-Eye Phlox (Phlox mesoleuca Greene)

POLYGALACEAE

Veiledseed Milkwort (Polygala obscura Benth.)

POLYGONACEAE

Tall Wildbuckwheat (Eriogonum tenellum Torr.)

Wright Wildbuckwheat (Eriogonum wrightii Torr. ex Benth.)

Silver-sheath Knotweed (Polygonum argyrcoleon Steud. ex Kunze)

Wild Rhubarb (Rumex hymenosepalus Torr.)

POLYPODIACEAE

Hairy Bommeria (Bommeria hispida (Mett. ex Kuhn) Underwood)

Eaton Lipfern (Cheilanthes eatonii Baker)

Woolly Lipfern (Cheilanthes tomentosa Link)

Bulb Cloakfern (Astrolepis sinuata ssp. sinuata (Lag. ex Sw.) Benham & Windham)

Wright Cliffbrake (Pellaea ternifolia (Cav.) Link)

PONTEDERIACEAE

Duck-salad (Heteranthera limosa (Sw.) Willd.)

PORTULACACEAE

Shaggy Portulaca (Portulaca mundula L.)

Orange Flameflower (Talinum aurantiacum Engelm.)

RANUNCULACEAE

Texas Virgin's Bower (Clematis drummondii Torr. & Gray)

Leather Flower (Clematis pitcheri Torr. & Gray)

RHAMNACEAE

Javelina Bush (Condalia ericoides (Gray) M. C. Johnston)

Green Condalia (Condalia viridis I. M. Johnston)

ROSACEAE

Black Cherry (Prunus serotina var. virens (Woot. & Standl.) McVaugh)

RUBIACEAE

Scarlet Bouvardia (Bouvardia ternifolia (Cav.) Schlecht)

Bracted Bedstraw (Galium microphyllum Gray)

RUTACEAE

Texas Desertrose (Thamnosma texana (Gray) Torr.)

SAPINDACEAE

Mexican Buckeye (Ungnadia speciosa Endl.)

SCROPHULARIACEAE

Snapdragon (Maurandella antirrhiniflora (Humb. & Bonpl. ex Willd.) Rothm.

Beardlip Penstemon (Penstemon barbatus (Cav.) Roth)

Fendler Penstemon (Penstemon fendleri Torr. & Gray)

SELAGINELLACEAE

Resurrection Plant (Selaginella mutica D. C. Eat. ex Underwood)

SOLANACEAE

Jimson-weed (Datura wrightii Regel)

Lobed Ground-cherry (Quincula lobata (Torr.) Raf.)

ULMACEAE

Net-leaf Hackberry (Celtis laevigata var. reticulata (Torr.) L. Benson)

Chinese Elm (Ulmus pumila L.)

VERBENACEAE

Whitebrush (Aloysia gratissima var. gratissima (Gillies & Hook.) Troncoso)

Oreganillo (Aloysia wrightii Heller ex Abrams)

New Mexico Verbena (Verbena neomexicana (Gray) Small)

Wright Verbena (Glandularia wrightii (Gray) Umber)

VITACEAE

Possum-grape (Cissus incisa Des Moulins)

Canyon Grape (Vitis arizonica Engelm.)

ZYGOPHYLLACEAE

Puncture-vine (Tribulus terrestris L.)

Appendix 7

The annotated plant list is based on collections conducted throughout the years 1995 (beginning in July), 1996, and 1997 (through June). The collection was performed by the author.

ACANTHACEAE

Snake-herb (Dyschoriste linearis (Torr. & Gray) Kuntze)--Native. Habitat: Rocky-grassy slopes, silty flats or about caprock. Distribution at FDNHS: On flats, in parade grounds, in dry stream bed, and on rocky slopes of Sleeping Lion and North Ridge mountains.

Hairy Tubetongue (Siphonoglossa pilosella (Nees) Torr.)--Native. Habitat: In rocky gravelly soil in chaparral on hills, banks, and along streams. Distribution at FDNHS: Flat open areas and on slopes of Sleeping Lion and North Ridge mountains.

AGAVACEAE

Soaptree Yucca (Yucca elata (Engelm.) Engelm.)--Native. Habitat: Gently sloping desert hills, grasslands, and in dry washes. Distribution at FDNHS: In open, non-maintained, areas, along slopes of and on top of Sleeping Lion and North Ridge mountains.

Texas Sacahuiste (Nolina texana S. Wats.)--Native. Habitat: Rocky soils. Distribution at FDNHS: On slopes, cliffs, and tops of Sleeping Lion and North Ridge mountains. Also on flat areas to the east of North Ridge mountain.

Sotol (Dasyilirion leiophyllum Engelm. ex Trel.)--Native. Habitat: Limestone hills. Distribution at FDNHS: On slopes, cliffs, and tops of Sleeping Lion and North Ridge mountains and on flat areas to the east of North Ridge mountain.

AMARANTHACEAE

Palmer's Amaranth (Amaranthus palmeri S. Wats.)--Native. Habitat: In silt, sandy, and gravelly soils, river banks, valleys, arroyos, drainage basins, and irrigation ditches. Distribution at FDNHS: In dry stream bed and dry runoff areas.

Stanley Bloodleaf (Iresine heterophylla Standl.)--Native. Habitat: In humus on and among boulders, dry rocky hills, sand-gravel and ledges. Distribution at FDNHS: In dry stream bed in Hospital Canyon.

Mat Chaff-flower (Alternanthera caracasana Kunth.)--Native. Habitat: In waste places. Distribution at FDNHS: Along disturbed areas, particularly the mowed fenceline areas.

Snake Cotton (Froelichia gracilis (Hook.) Moq.)--Native. Habitat: On gravel and in sandy soils. Distribution at FDNHS: On top of and along slopes of North Ridge mountain.

Woolly Tidestromia (Tidestromia lanuginosa var. lanuginosa (Nutt.) Standl.)--Native. Habitat: Dry ground, along roadsides, limestone-sandy soils. Distribution at FDNHS: Along disturbed areas, particularly the mowed fenceline areas.

AMARYLLIDACEAE

Zephyr-lily (Zephyranthes longifolia Hemsl.)--Native. Habitat: Alkaline soils. Distribution at FDNHS: On parade grounds, flats, and in Hospital canyon on higher ground.

ANACARDIACEAE

Evergreen Sumac (Rhus virens Lindheimer ex Gray)--Native. Habitat: In gullies and on rocky bluffs, slopes, and banks, on dry hillsides and mountainsides. Distribution at FDNHS: On slopes of Sleeping Lion and North Ridge mountains.

Little Leaf Sumac (Rhus microphylla Engelm. ex Gray)--Native. Habitat: In scrub, dry uplands, thickets, and open alkali flats, on desert plains, dry rocky river banks, mesas, and foothills. Distribution at FDNHS: On banks of dry stream bed.

Skunkbush (Rhus trilobata var. pilosissima Engelm.)--Native. Habitat: Loose sands, sandy soil, and on hills. Distribution at FDNHS: On slopes of Sleeping Lion and North Ridge mountains.

APIACEAE

Mexican Thistle (Eryngium heterophyllum Engelm.)--Native. Habitat: Sandy soils. Distribution at FDNHS: Open flat areas and along lower slopes of Sleeping Lion and North Ridge mountains.

APOCYNACEAE

Dogbane (Telosiphonia macrosiphon (Torr.) Henrickson)--Native. Habitat: Dry rocky open or

brushy slopes. Distribution at FDNHS: On lower slopes of North Ridge mountain.

ARISTOLOCHIACEAE

Wright Dutchmanspipe (Aristolochia wrightii Seem)--Native. Habitat: Walls of canyons, among boulders, and on rocky hills. Distribution at FDNHS: On rocky slopes of North Ridge mountain.

ASCLEPIADACEAE

Hierba de Zizotes (Asclepias oenotheroides Cam. & Schlecht)--Native. Habitat: Rocky, chiefly clay soils in llanos, mesas and hills, and in dunes. Distribution at FDNHS: In median of parking area, and along roadside.

Broad-leaf Milkweed (Asclepias latifolia (Torr.) Raf.)--Native. Habitat: Mixed prairies, badlands, and high plains. Distribution at FDNHS: In flat brushy areas and lower slopes of Sleeping Lion and North Ridge mountains.

Texas Milkweed (Asclepias texana Heller)--Native. Habitat: Canyons, arroyos, and rocky hills. Distribution at FDNHS: On slopes of North Ridge mountain.

Whorled Milkweed (Asclepias subverticillata (Gray) Vail)--Native. Habitat: Sandy and rocky plains and flats. Distribution at FDNHS: In dry stream bed and in disturbed ground.

Shortcrown Milkweed (Asclepias brachystephana Engelm. ex Torr.)--Native. Habitat: Sandy

and rocky plains, dry flats, gullies, and stream banks. Distribution at FDNHS: In parade grounds and disturbed ground.

ASTERACEAE

Plains Ironweed (Vernonia marginata (Torr.) Raf.)--Native. Habitat: Various. Distribution at FDNHS: In flat open areas.

California Brickellia (Brickellia californica (Torr. & Gray) Gray)--Native. Habitat: Rocky places. Distribution at FDNHS: In dry stream bed in Hospital canyon.

Resinleaf Brickellia (Brickellia baccharidea Gray)--Native. Habitat: Various. Distribution at FDNHS: In dry stream bed in Hospital canyon.

Willow Baccharis (Baccharis salicina Torr. & Gray)--Native. Habitat: Usually in disturbed places, often in sandy subsaline soil. Distribution at FDNHS: In dry stream bed and along watercourses.

Tatalencho (Gymnosperma glutinosum (Spreng.) Less.)--Native. Habitat: Dry brushy or grassy areas. Distribution at FDNHS: Along eastern slopes of North Ridge mountain.

Broomweed (Gutierrezia sarothrae (Pursh) Britt. & Rusby)--Native. Habitat: Open calcareous areas. Distribution at FDNHS: On slopes of Sleeping Lion and North Ridge mountains.

Pinnatifid Aster (Machaeranthera pinnatifida (Hook.) Shinnery)--Native. Habitat: In limestone mountains. Distribution at FDNHS: In Cottonwood picnic areas, and on slopes of North Ridge mountain.

Smoothleaved Aster (Machaeranthera gracilis (Nutt.) Shinnery)--Native. Habitat: Sandy loam. Distribution at FDNHS: In dry stream bed, in open flat areas.

Toothed Machaeranthera (Machaeranthera blephariphylla (Gray) Shinnery)--Native. Habitat: Limestone mountains. Distribution at FDNHS: In disturbed ground along fenceline.

Plains Fleabane (Erigeron modestus Gray)--Native. Habitat: Open, usually dry calcareous uplands. Distribution at FDNHS: In parade grounds, flat areas, disturbed ground, and along maintenance road.

Lyre-Leaf Chocolate Flower (Berlandiera lyrata Benth.)--Native. Habitat: Dry rocky limestone soils. Distribution at FDNHS: In flat open areas, parade grounds, and meadows.

Engelmann's Daisy (Engelmannia pinnatifida Gray ex Nutt.)--Native. Habitat: Calcareous open uplands. Distribution at FDNHS: In dry stream bed, and in meadows.

Lyre-leaf Parthenium (Parthenium confertum Gray)--Native. Habitat: In deserts and mountains.

Distribution at FDNHS: In disturbed ground, flat areas near parking area.

Woolly Sump-weed (Iva dealbata Gray)--Native. Habitat: Calcareous deserts. Distribution at FDNHS: Median of parking lot, along roadside.

Common Cocklebur (Xanthium strumarium L.)--Native. Habitat: Throughout. Distribution at FDNHS: In disturbed ground around Hospital canyon maintenance area.

Plains Zinnia (Zinnia grandiflora Nutt.)--Native. Habitat: Dry calcareous areas. Distribution at FDNHS: On parade grounds, and flat open areas.

Mexican Hat (Ratibida columnifera (Nutt.) Woot. & Standl.)--Native. Habitat: Open usually calcareous soils. Distribution at FDNHS: In dry stream bed, on open flat areas, parade grounds, and meadows.

Dentateleaf Goldeneye (Viguiera dentata (Cav.) Spreng.)--Native. Habitat: Cuestas of chalky limestone. Distribution at FDNHS: On disturbed ground along maintenance road.

Heartleaf Goldeneye (Viguiera cordifolia Gray)--Native. Habitat: Limestone areas. Distribution at FDNHS: on slopes of North Ridge mountain.

Sunflower (Helianthus annuus L.)--Native. Habitat: Various. Distribution at FDNHS: In open meadows.

Golden Crown Daisy (Verbesina encelioides (Cav.) Benth. & Hook. f. ex Gray)--Native.

Habitat: Disturbed soils. Distribution at FDNHS: In dry stream bed and along watercourses.

Lawnflower (Calyptracarpus vialis Less.)--Native. Habitat: Lawns, disturbed areas. Distribution at FDNHS: In Cottonwood picnic area, and grassy maintained areas.

Bigelow Beggars-Ticks (Bidens bigelovii Gray)--Native. Habitat: Frequent in moist canyons.

Distribution at FDNHS: Along disturbed eastern fenceline.

Rayless Greenthread (Thelesperma megapotamicum (Spreng.) Kuntze)--Native. Habitat:

Widespread and usually common in calcareous or alkaline uplands and lowlands. Distribution at FDNHS: In flat, open areas, meadows, and along slopes and on top of Sleeping Lion and North Ridge mountains.

Slender Gaillardia (Gaillardia pinnatifida Torr.)--Native. Habitat: Grasslands. Distribution at

FDNHS: In dry stream bed, open flat areas, parade grounds, and meadows.

Bitterweed (Helenium amarum var. badium (Gray ex S. Wats.) Waterfall)--Native. Habitat:

Calcareous disturbed soils. Distribution at FDNHS: In watercourses on eastern side of North Ridge mountain.

Plains Bitterweed (Tetaneuris scaposa var. scaposa (DC.) Greene)--Native. Habitat: Limestone soil. Distribution at FDNHS: In dry stream bed, along watercourses, in water drainage areas, and in open flat areas and meadows.

Damianita (Chrysactinia mexicana Gray)--Native. Habitat: Limestone. Distribution at FDNHS: Along maintenance road to Hospital canyon, and in disturbed areas.

Yerba Raton (Bahia bigelovii Gray)--Native. Habitat: Moist canyons. Distribution at FDNHS: In Cottonwood picnic area.

Silver Wormwood (Artemisia ludoviciana Nutt.)--Native. Habitat: Various. Distribution at FDNHS: On eastern slopes of Sleeping Lion mountain.

Threadleaf Groundsel (Senecio flaccidus var. flaccidus Less.)--Native. Habitat: Various. Distribution at FDNHS: On slopes of North Ridge mountain and in flat brushy areas.

Wavy-leaf Thistle (Cirsium undulatum (Nutt.) Spreng.)--Native. Habitat: Various. Distribution at FDNHS: In dry stream bed, in open flat areas, and in disturbed ground.

California Trixis (Trixis californica Kellogg)--Native. Habitat: Canyons. Distribution at FDNHS: On slopes and on top of North Ridge mountain.

Brownfoot (Acourtia wrightii (Gray) Reveal & King)--Native. Habitat: Frequent. Distribution at FDNHS: In dry stream bed, and on rocky slopes of Sleeping Lion and North Ridge mountains.

Texas Skeletonplant (Lygodesmia texana (Torr. & Gray) Greene)--Native. Habitat: Open usually calcareous areas. Distribution at FDNHS: Open fields and meadows.

Desert Wire-lettuce (Stephanomeria pauciflora (Torr.) A. Nelson)--Native. Habitat: Crevices and exposed rocky prairies. Distribution at FDNHS: In dry stream bed, and in flat, open areas.

Goat's Beard (Tragopogon dubius Scop.)--Exotic. Habitat: Disturbed ground. Distribution at FDNHS: Near buildings, and in disturbed ground.

Hawkweed (Hieraceum carneum Greene)--Native. Habitat: Igneous soil. Distribution at FDNHS: Along upper slopes and top of North Ridge mountain.

Dandelion (Taraxacum officinale G. H. Weber ex Wiggers)--Exotic. Habitat: Lawns, roadsides, disturbed favorable places. Distribution at FDNHS: Flat open areas and disturbed ground.

Palmleaf Thoroughwort (Conoclinium dissectum Gray)--Native. Habitat: Along stream beds and in overflow areas. Distribution at FDNHS: On slopes of North Ridge mountain.

Rock-lettuce (Pineropappus roseus (Less.) Less.)--Native. Habitat: Open limestone areas.

Distribution at FDNHS: On slopes of North Ridge mountain.

Seep-willow (Baccharis salicifolia (Ruiz & Pav`on) Pers.)--Native. Habitat: Water drainage areas. Distribution at FDNHS: In water drainage area near Cottonwood picnic area, and along watercourses.

Eupatoriaceae Brickellia (Brickellia eupatorioides var. chlorolepis (Woot. & Standl.) B.L. Turner)--Native. Habitat: Rocky hillsides. Distribution at FDNHS: In dry creek bed in Hospital canyon.

BERBERIDACEAE

Agarito (Mahonia trifoliata (Moric.) Fedde)--Native. Habitat: Rocky slopes and flats of pastures, thickets, and open woods. Distribution at FDNHS: Along rocky slopes of Sleeping Lion and North Ridge mountains.

BIGNONIACEAE

Yellow Bells (Tecoma stans (L.) Juss.)--Native. Habitat: Rocky areas in mountains. Distribution at FDNHS: On slopes and top of Sleeping Lion and North Ridge mountains.

Desert Willow (Chilopsis linearis (Cav.) Sweet)--Native. Habitat: Commonly along watercourses. Distribution at FDNHS: Ornamental on officers's row.

BORAGINACEAE

Fringed Puccoon (Lithospermum incisum Lehm.)--Native. Habitat: Various habitat types but usually in sandy soils of prairies, fields and open-wooded areas. Distribution at FDNHS: Near buildings, and in open flat areas.

BRASSICACEAE

Wright Thelypody (Thelypodium wrightii Gray)--Native. Habitat: Cliffs, canyon walls, and lower mountain slopes. Distribution at FDNHS: On slopes of Sleeping Lion and North Ridge mountains.

London Rocket (Sisymbrium irio L.)--Exotic. Habitat: Fields, roadsides, waste places, and open deserts. Distribution at FDNHS: Near buildings and in disturbed areas.

Mountain Mustard (Schoenocrambe linearifolia (Gray) Rollins)--Native. Habitat: Ledges, crevices or rocks, steep hillsides, and open brushland, mountains, and hills. Distribution at FDNHS: In flat, open areas and on lower slopes of Sleeping Lion mountain.

Pinnate Tansy Mustard (Descurainia pinnata (Walt.) Britt.)--Native. Habitat: In sandy soils and waste places. Distribution at FDNHS: Near buildings and in disturbed areas.

Mountain Peppergrass (Lepidium alyssoides Nutt.)--Native. Habitat: Sandy, saline, or calcereous soils. Distribution at FDNHS: In flat open areas and in parade grounds.

Fendler Bladderpod (Lesquerella fendleri (Gray) S. Wats.)--Native. Habitat: Sandy or rocky soils, especially calcereous. Distribution at FDNHS: In flat open areas and along top of North Ridge mountain.

CACTACEAE

Cholla (Opuntia imbricata (Haw.) DC.)--Native. Habitat: Gravelly or sandy soils. Distribution at FDNHS: On banks of stream beds, on slopes of Sleeping Lion and North Ridge mountains.

Engelmann Prickly Pear (Opuntia engelmannii Salm-Dyck)--Native. Habitat: Various. Distribution at FDNHS: On slopes of Sleeping Lion and North Ridge mountains and in flat brushy areas.

Strawberry Cactus (Echinocereus coccineus Engelm.)--Native. Habitat: Various. Distribution at FDNHS: On top of North Ridge mountain.

Green-flowered Torch Cactus (Echinocereus chloranthus var. cylindricus (Engelm.) N.P. Taylor)--Native. Habitat: Limestone areas. Distribution at FDNHS: On top of and on higher slopes of North Ridge mountain.

Whiskered Barrel Cactus (Ferocactus hamatacanthus (Muehlenpfordt) Britt. & Rose)--Native. Habitat: Desert and grasslands. Distribution at FDNHS: Upper slopes of North Ridge mountain.

CARYOPHYLLACEAE

Drymary (Drymaria laxiflora Benth.)--Native. Habitat: In soils about base of boulders and in crevices in mountains. Distribution at FDNHS: Under boulder at foot of madrone tree on Sleeping Lion mountain.

CHENOPODIACEAE

White Goosefoot (Chenopodium album Kunth.)--Exotic. Habitat: Disturbed areas and waste places. Distribution at FDNHS: In drainage runoff area near Cottonwood picnic area. Along roadsides.

Four-wing Saltbush (Atriplex canescens (Pursh.) Nutt.)--Native. Habitat: Dry mesas and alkaline valleys, prairies, and hillsides. Distribution at FDNHS: At foot of North Ridge mountain and in Hospital canyon.

Tumbleweed (Salsola kali L.)--Exotic. Habitat: Dry plains and valleys, common along roadsides and in cultivated fields. Distribution at FDNHS: Along roadway, watercourses, and in disturbed areas.

COMMELINACEAE

Erect Dayflower (Commelina erecta var. angustifolia (Michx.) Fern.)--Native. Habitat: In grassy areas, on limestone slopes. Distribution at FDNHS: On slopes of Sleeping Lion and North Ridge mountains, on top of North Ridge mountain. In flat areas and meadows.

Ohio Spiderwort (Tradescantia ohiensis Raf.)--Native. Habitat: In meadows, prairies, and thickets. Distribution at FDNHS: On parade grounds, meadows, and open areas on top of North Ridge mountain.

CONVOLVULACEAE

Silver Ponyfoot (Dichondra argentea Humb. & Bonpl. ex Willd.)--Native. Habitat: Dry rocky slopes. Distribution at FDNHS: Near buildings and on slopes of North Ridge mountain.

Slender Evolvulus (Evolvulus alsinoides (L.) L.)--Native. Habitat: Various. Distribution at FDNHS: In disturbed ground, and along maintenance road.

Hairy Evolvulus (Evolvulus nuttallianus J. A. Shultes)--Native. Habitat: Rocky or sandy ground. Distribution at FDNHS: Along maintenance road, and in disturbed soils.

Texas Bindweed (Convolvulus equitans Benth.)--Native. Habitat: Prairies or disturbed ground, especially in rocky or sandy soil. Distribution at FDNHS: In flat open areas, parade grounds, and meadows.

Ivy Morning Glory (Ipomoea cristulata Hallier f.)--Native. Habitat: In canyons. Distribution at FDNHS: On shrubs of North Ridge mountain.

Morning Glory (Ipomoea purpurea (L.) Roth.)--Exotic. Habitat: In waste places and disturbed ground. Distribution at FDNHS: In dry stream bed under footbridge.

CUCURBITACEAE

Buffalo Gourd (Cucurbita foetidissima Kunth)--Native. Habitat: In sandy or gravelly soils in waste places. Distribution at FDNHS: In flat open areas and in disturbed ground.

Texas Gourd (Cucurbita texana Gray)--Native. Habitat: In debris, along rivers. Distribution at FDNHS: In flat open areas and in disturbed ground.

CUPRESSACEAE

Alligator Juniper (Juniperus deppeana Steud.)--Native. Habitat: On grassy open rocky hills and slopes and in scrub oak areas. Distribution at FDNHS: On top of and along cliffs of Sleeping Lion and North Ridge mountains. Also in Hospital canyon area.

Red-berry Juniper (Juniperus pinchotii Sudworth)--Native. Habitat: In rocky soils on open flats and dry hills, in arroyos and canyons, commonly about limestone. Distribution at FDNHS: In Hospital canyon area and on top of and along cliffs of Sleeping Lion and North Ridge mountains.

EPHEDRACEAE

Long-leaf Ephedra (Ephedra trifurca Torr. ex S. Wats.)--Native. Habitat: Sandy and gravelly soils on hills & plains, along dry creek beds in arroyos and in desert scrub areas. Distribution at

FDNHS: Ornamental near footbridge, on slopes of Sleeping Lion and North Ridge mountains.

ERICACEAE

Madrone (Arbutus xalapensis Kunth)--Native. Habitat: On wooded rocky hills and mountain slopes, in canyons. Distribution at FDNHS: On upper slope, north side, of Sleeping Lion mountain.

EUPHORBIACEAE

Scented Croton (Croton suaveolens Torr.)--Native. Habitat: On syenite bluffs. Distribution at FDNHS: On slopes of North Ridge mountain.

Leatherweed Croton (Croton pottsii (Klutzsch) Muell.-Arg.)--Native. Habitat: Desert grasslands and scrub. Distribution at FDNHS: In flat open areas, and parade grounds.

Lindheimer Copperleaf (Acalypha lindheimeri Muell.-Arg.)--Native. Habitat: In dry sandy soil. Distribution at FDNHS: Near cottonwood picnic area and along banks of dry stream bed, particularly deeper into Hospital canyon.

Hophornbeam Copperleaf (Acalypha ostryifolia Riddell)--Native. Habitat: Dry sandy soil in open woods, fields, and roadsides. Distribution at FDNHS: Western boundary in Hospital canyon general area.

Branching Noseburn (Tragia ramosa Torr.)--Native. Habitat: Open areas and disturbed habitat. Distribution at FDNHS: On slopes of Sleeping Lion mountain in disturbed ground.

Squareseed Spurge (Euphorbia exstipulata Engelm.)--Native. Habitat: Shallow calcareous soil over limestone. Distribution at FDNHS: In dry stream bed, on banks, and in disturbed soils.

Toothed Spurge (Euphorbia dentata Michx.)--Native. Habitat: Variety of soils. Distribution at FDNHS: In dry stream bed, on banks, and in disturbed soils.

Whitemargin Spurge (Chamaesyce albomarginata (Torr. & Gray) Small)--Native. Habitat: Poorly drained clay soil. Distribution at FDNHS: Flat areas, disturbed ground along fenceline.

FAGACEAE

Gray Oak (Quercus grisea Liebm.)--Native. Habitat: Rocky igneous or dolomitic soils. Distribution at FDNHS: On rocky slopes and tops of Sleeping Lion and North Ridge mountains. Also in Hospital canyon.

Emory Oak (Quercus emoryi Torr.)--Native. Habitat: Igneous mountains. Distribution at FDNHS: On rocky slopes and tops of Sleeping Lion and North Ridge mountains. Also in Hospital canyon.

FABACEAE

White-Thorn Acacia (Acacia constricta Benth.)--Native. Habitat: Arid areas. Distribution at FDNHS: In Hospital canyon, on slopes of Sleeping Lion and North Ridge mountains and in some brushy flat areas at foot of North Ridge mountain.

Little-leaf Lead-tree (Leucaena retusa Benth.)--Native. Habitat: Dry canyons. Distribution at FDNHS: On slopes of North Ridge mountain.

Catclaw Mimosa (Mimosa aculeaticarpa var. biuncifera (Benth.) Barneby)--Native. Habitat: Arid areas. Distribution at FDNHS: On slopes of Sleeping Lion and North Ridge mountains, and in some flat brushy areas.

Cooley Bundleflower (Desmanthus cooleyi (Eat.) Trel.)--Native. Habitat: Grasslands. Distribution at FDNHS: On parade grounds and flat open areas.

Honey Mesquite (Prosopis glandulosa Torr.)--Native. Habitat: Various. Distribution at FDNHS: On slopes of Sleeping Lion and North Ridge mountains and along water drainage areas.

Roemer Senna (Senna roemeriana (Scheele) Irwin & Barneby)--Native. Habitat: In fields and open woods on limestone soils. Distribution at FDNHS: On slopes of North Ridge mountain and in open flat areas.

Lindheimer Senna (Senna lindheimeriana (Scheele) Irwin & Barneby)--Native. Habitat: Limestone soils. Distribution at FDNHS: Open flat areas and on slopes of North Ridge

mountain.

Hog-potato (Hoffmannseggia glauca (Ortega) Eifert)--Native. Habitat: Roadsides. Distribution at FDNHS: Open, flat areas, near buildings, and along roadsides.

Silky Sophora (Sophora nuttalliana B. L. Turner)--Native. Habitat: Grama grasslands.

Distribution at FDNHS: Disturbed areas along mowed fenceline area.

Texas Mountain Laurel (Sophora secundiflora (Ortega) Lag. ex DC.)--Native. Habitat: Brushy vegetation and caliche cuevas. Distribution at FDNHS: On slopes of Sleeping Lion and North Ridge mountains.

Bur-clover (Medicago minima (L.) L.)--Exotic. Habitat: Various. Distribution at FDNHS: Flat open areas.

Deer Vetch (Lotus plebeius (Brand) Barneby)--Native. Habitat: Basaltic rock soils. Distribution at FDNHS: Flat open areas, particularly around Hospital building.

Wright Dalea (Dalea wrightii Gray)--Native. Habitat: Various. Distribution at FDNHS: Along top of North Ridge mountain.

Feather-plume (Dalea formosa Torr.)--Native. Habitat: Dry scrubby vegetation. Distribution at FDNHS: In dry stream bed in Hospital canyon.

Big Bend Locoweed (Astragalus mollissimus var. earlei (Greene ex Rydb.) Tidestrom)--Native.

Habitat: Various. Distribution at FDNHS: Along side of main road.

Nuttall's Locoweed (Astragalus nuttallianus var. austrinus (Small) Barneby)--Native. Habitat:

Various. Distribution at FDNHS: In disturbed ground near buildings.

Graham Tickclover (Desmodium grahamii Gray)--Native. Habitat: Higher elevations.

Distribution at FDNHS: On upper slopes and top of North Ridge mountain.

Texas Snoutbean (Rhynchosia senna var. texana (Torr. & Gray) M.C. Johnston)--Native.

Habitat: Various. Distribution at FDNHS: On slopes of North Ridge mountain.

Snoutbean (Rhynchosia senna Gillies ex Hook.)--Native. Habitat: Various. Distribution at

FDNHS: On slopes of North Ridge mountain.

GERANIACEAE

Alfileria (Erodium cicutarium (L.) L'Hér. ex Ait.)--Exotic. Habitat: Rocky or sandy soil in various types of habitat. Distribution at FDNHS: Flat open areas, along roadside.

HYDROPHYLLACEAE

Rough Nama (Nama hispidum Gray)--Native. Habitat: In sand and on gravelly soil in diverse

habitats. Distribution at FDNHS: Along maintenance road, and in disturbed ground.

LAMIACEAE

Horehound (Marrubium vulgare L.)--Exotic. Habitat: In waste places, along roadsides.

Distribution at FDNHS: Near Cottonwood picnic area, near buildings and in maintenance area in Hospital canyon.

LOASACEAE

Stinging Cevallia (Cevallia sinuata Lag.)--Native. Habitat: Open areas, often along roadsides, on various coarse substrates. Distribution at FDNHS: On flat open areas.

Wavyleaf Mentzelia (Mentzelia albescens (Gillies & Arn.) Griseb.)--Native. Habitat: Open disturbed sites, ruderal. Distribution at FDNHS: On banks of dry stream bed, on flat open areas.

LOGANIACEAE

Escobilla Butterflybush (Buddleja scordioides Kunth)--Native. Habitat: In limestone soil and rocky areas. Distribution at FDNHS: In water runoff area by Cottonwood picnic area. In shady areas.

MALVACEAE

Littleleaf Abutilon (Abutilon parvulum Gray)--Native. Habitat: On limestone hills, dry ledges. Distribution at FDNHS: Along slopes of North Ridge mountain.

Scarlet Mallow (Sphaeralcea coccinea ssp. coccinea (Nutt.) Rydb.)--Native. Habitat: Caliche outcrops and gypsum, and in gravelly-limestone and sandy-clayey soils on breaks, plains, and hills. Distribution at FDNHS: On flat open areas.

Narrow-leaf Globe Mallow (Sphaeralcea angustifolia ssp. angustifolia (Cav.) G. Don)--Native. Habitat: Sandy or rocky soils, mostly limestone and gypsum, waste places and along roadsides. Distribution at FDNHS: On flat open areas.

Bracted Sida (Sida ciliaris L.)--Native. Habitat: In sandy soils of pastures, scrub oaks, mesquite thickets, and along roadsides and on clay flats. Distribution at FDNHS: Median of parking area, disturbed ground.

MARTYNIACEAE

Devil's Claw (Proboscidea louisianica (Mill.) Thell.)--Native. Habitat: In meadows, playas, waste places, and on stream banks. Distribution at FDNHS: In dry stream bed under footbridge, in median of parking area, and along side of main road.

NYCTAGINACEAE

Devil's Bouquet (Nyctaginia capitata Choisy)--Native. Habitat: In sandy or loamy soils, roadsides, and fields. Distribution at FDNHS: Median of parking area, and along the roadsides.

Linearleaf Four O'Clock (Mirabilis linearis (Pursh) Heimerl.)--Native. Habitat: Dry ground,

limestone, sandy plains, igneous soils. Distribution at FDNHS: In open areas, parade grounds, and flats.

White Four O’Clock (Mirabilis albida (Walt.) Heimerl.)--Native. Habitat: In dry soils, meadows, and hillsides. Distribution at FDNHS: On slopes of North Ridge mountain.

Scarlet Spiderling (Boerhavia coccinea P. Mill)--Native. Habitat: Waste places, fields, and river banks. Distribution at FDNHS: Median of parking areas, along roadside, Cottonwood picnic area, and disturbed ground.

Slimstalk Spiderling (Boerhavia gracillima Heimerl.)--Native. Habitat: Dry plains, fields, rocky hillsides. Distribution at FDNHS: On slopes and tops of Sleeping Lion and North Ridge mountains.

Narrowleaf Spiderling (Boerhavia linearifolia Gray)--Native. Habitat: In arid places, rocky bluffs, open draws in desert, limestone hills. Distribution at FDNHS: On tops and slopes of Sleeping Lion and North Ridge mountains.

ONAGRACEAE

Hartweg’s Sundrops (Calilophus hartwegii ssp. hartwegii (Benth.) Raven)--Native. Habitat: Mountains and canyons. Distribution at FDNHS: On slopes of North Ridge mountain.

Lizard-tail (Gaura parviflora Dougl. ex Lehm.)--Native. Habitat: In disturbed ground, various habitats. Distribution at FDNHS: Near buildings, and in disturbed areas.

Scarlet Gaura (Gaura coccinea Nutt. ex Rydb.)--Native. Habitat: Sandy soils. Distribution at FDNHS: In Cottonwood picnic area, open meadows.

Wild Kisses (Gaura suffulta Nutt. ex Ser.)--Native. Habitat: Open sandy areas. Distribution at FDNHS: Near buildings and in disturbed ground.

Shortpod Evening Primrose (Oenothera brachycarpa Gray)--Native. Habitat: Rocky slopes. Distribution at FDNHS: In parade grounds and flat open areas.

Prairie Evening Primrose (Oenothera albicaulis Pursh)--Native. Habitat: Sandy places. Distribution at FDNHS: In parade grounds and flat open areas.

OXALIDACEAE

Radishroot Oxalis (Oxalis albicans Kunth)--Native. Habitat: On gravelly-grassy flats, in igneous soils in canyons. Distribution at FDNHS: Open, flat areas.

PAPAVERACEAE

Deeplobed Prickly Poppy (Argemone squarrosa ssp. glabrata G.B. Ownbey)--Native. Habitat: In arid valleys and on slopes. Distribution at FDNHS: In flat open areas and on lower slopes of

Sleeping Lion and North Ridge mountains.

PHYTOLACCACEAE

Rouge-plant (Rivina humilis L.)--Native. Habitat: In moist or alluvial soils, chaparral hills, usually in partial shade of trees or shrubs. Distribution at FDNHS: Along watercourses.

POACEAE

Pinyon Ricegrass (Piptochaetium fimbriatum (Kunth) A.S. Hitchc.)--Native. Habitat: Pine forests on rocky slopes of usually igneous rocks. Distribution at FDNHS: In dry creek bed and near water runoff areas, in disturbed soils.

Longleaf Squirreltail (Elymus elymoides (Raf.) Swezey)--Native. Habitat: Disturbed areas. Distribution at FDNHS: In dry stream bed near footbridge, near water runoff areas.

Hairy Crabgrass (Digitaria sanguinalis (L.) Scop.)--Exotic. Habitat: Disturbed soils along roads in fields and gardens. Distribution at FDNHS: Dry stream bed in Hospital canyon, disturbed soils near water runoff areas.

Halls Panicum (Panicum hallii var. hallii Vasey)--Native. Habitat: Rocky dry uplands. Distribution at FDNHS: Near buildings, in flat, disturbed areas.

Filly Panicum (Panicum hallii var. filipes (Scribn.) Waller)--Native. Habitat: Semi-dry habitats.

Distribution at FDNHS: In dry stream bed, near water runoff areas.

Barnyardgrass (Echinochloa crusgalli (L.) Beauv.)--Native. Habitat: Disturbed loamy soils.

Distribution at FDNHS: Dry stream bed in Hospital canyon, water runoff areas.

Plains Bristlegrass (Setaria leucopila (Scribn. & Merr.) K. Schum.)--Native. Habitat: Dry plains and upland slopes, abundant along stream beds. Distribution at FDNHS: Near buildings, in disturbed soils.

Grisebach Bristlegrass (Setaria grisebachii Fourn.)--Native. Habitat: Protected habitats mostly in canyons, on mountain slopes, and under trees. Distribution at FDNHS: In dry stream bed in Hospital canyon, near water runoff areas.

Yellow Bristlegrass (Setaria pumila (Poir.) Roemer & J. A. Shultes)--Exotic. Habitat: Protected canyons, and disturbed habitats. Distribution at FDNHS: In flat open areas near buildings and in disturbed areas.

Grassbur (Cenchrus carolinianus Walt.)--Native. Habitat: Sandy or tighter soils, disturbed areas. Distribution at FDNHS: Near buildings, in disturbed soils, in moist areas.

Cane Bluestem (Bothriochloa barbinodis var. barbinodis (Lag.) Herter)--Native. Habitat: Widely distributed in various soil types and habitats. Distribution at FDNHS: In areas of water runoff, open flat areas.

Johnsongrass (Sorghum halapense (L.) Pers.)--Exotic. Habitat: Open ground, fields, and waste places. Distribution at FDNHS: In dry stream bed near footbridge.

Tanglehead (Heteropogon contortus (L.) Beauv. ex Roemer & J. A. Shultes)--Native. Habitat: Sandy prairies. Distribution at FDNHS: In flat open areas, near buildings, and around water runoff areas.

Burrograss (Scleropogon brevifolius Phil.)--Native. Habitat: Desert alluvial flats and fans. Distribution at FDNHS: In flat areas near buildings, in moist areas.

Mediterranean Lovegrass (Eragrostis barrelieri Daveau)--Exotic. Habitat: Along roads and other disturbed areas. Distribution at FDNHS: In flat open areas, near buildings, and in disturbed soils.

Mexican Lovegrass (Eragrostis mexicana (Hornem.) Link.)--Native. Habitat: Protected canyons and slopes and in disturbed ground. Distribution at FDNHS: In shade along disturbed areas along maintenance road to Hospital canyon.

Plains Lovegrass (Eragrostis intermedia A. S. Hitchc.)--Native. Habitat: Rocky slopes, canyons, and alluvial basins. Distribution at FDNHS: Near buildings, in disturbed soils.

Alkali Sacaton (Sporobolus airoides (Torr.) Torr.)--Native. Habitat: Open ground, prairies or sand flats or occasionally alkali or subsaline playas or gravelly and rocky slopes. Distribution at FDNHS: In flat, open areas, near horse pen, in disturbed areas, and in areas of water runoff.

Deergrass (Muhlenbergia rigens (Benth.) A.S. Hitchc.)--Native. Habitat: Loamy flats, usually along small streams. Distribution at FDNHS: In and along dry stream bed in Hospital canyon.

Green Sprangletop (Leptochloa dubia (Kunth) Nees)--Native. Habitat: Rocky slopes and alluvial loams. Distribution at FDNHS: In dry stream bed in Hospital canyon, near water runoff areas.

Bermudagrass (Cynodon dactylon (L.) Pers.)--Exotic. Habitat: Loamy, usually alluvial, seasonally moist, sometimes alkaline or subsaline, soils. Distribution at FDNHS: Flat areas, disturbed and regularly mowed areas of parade grounds, and cottonwood picnic area.

Windmillgrass (Chloris verticillata Nutt.)--Native. Habitat: Packed rocky or calcareous gravelly and sandy loam, disturbed areas, roadsides, and eroded plains. Distribution at FDNHS: In flat open areas, near buildings, and in disturbed ground.

Showy Chloris (Chloris virgata Sw.)--Native. Habitat: Usually disturbed areas, prairies, roadsides, and streambeds. Distribution at FDNHS: In flat areas near buildings, in open meadows.

Blue Grama (Bouteloua gracilis (Willd. ex Kunth.) Lag. ex Griffiths)--Native. Habitat: Prairies and open low scrub on plains, usually in gravelly or sandy loam. Distribution at FDNHS: Throughout parade grounds and flat areas, including top of North Ridge mountain.

Sideoats Grama (Bouteloua curtipendula (Michx.) Torr.)--Native. Habitat: Prairies and grasslands or open brush or forest openings on alluvial loam or among rocks on steep slopes. Distribution at FDNHS: Open flat areas, meadows, along slopes of Sleeping Lion and North Ridge mountains.

Feather Pappusgrass (Enneapogon desvauxii Beauv.)--Native. Habitat: Desert flats and hills. Distribution at FDNHS: Flat open areas, near buildings, and in disturbed areas.

Sixweeks Threawn (Aristida adscensionis L.)--Native. Habitat: Dry soils, along roads and other disturbed areas. Distribution at FDNHS: In flat open areas and disturbed ground. Near water runoff areas.

Poverty Threawn (Aristida divaricata Humb. & Bonpl. ex Willd.)--Native. Habitat: Grasslands and scrub on slopes at elevations greater than 4,000 feet. Distribution at FDNHS: In flat open areas and disturbed ground. Near water runoff areas.

Hook Threawn (Aristida ternipes var. hamulosa (Henr.) Trent)--Native. Habitat: Rocky slopes,

mesas, canyons, and basins, or plains. Distribution at FDNHS: In flat open areas.

PLANTAGINACEAE

Red-seeded Plantain (Plantago rhodosperma Dcne.)--Native. Habitat: In rocky soils in brush lands and on slopes, occasionally in sandy soils and on gravel bars of washes and streams.

Distribution at FDNHS: Along side of main road.

POLEMONIACEAE

Skyrocket (Ipomopsis aggregata (Pursh) V. Grant)--Native. Habitat: Dry rocky slopes.

Distribution at FDNHS: In dry stream bed and along watercourses.

Santa Fe Phlox (Phlox nana Nutt.)--Native. Habitat: Rocky slopes. Distribution at FDNHS: In open areas, rocky slopes of Sleeping Lion and North Ridge mountains, and along watercourses.

POLYGALACEAE

Veiledseed Milkwort (Polygala obscura Benth.)--Native. Habitat: On open or brushy dry slopes.

Distribution at FDNHS: In and along dry stream bed. In flat areas.

POLYGONACEAE

Wet Piper Polygonum (Polygonum hydropiperoides Michx.)--Native. Habitat: Wet areas.

Distribution at FDNHS: In dry stream bed in Hospital Canyon.

Tall Wildbuckwheat (Eriogonum tenellum Torr.)--Native. Habitat: On rocky slopes, ledges, or

crevices, or on open rock outcrops in grasslands. Distribution at FDNHS: On bare rocky ground on slopes of and on top of North Ridge mountain.

POLYPODIACEAE

Wright Cliffbrake (Pellaea wrightiana Hook.)--Native. Habitat: Shelters of boulders in exposed situations. Distribution at FDNHS: On slopes and cliffs of Sleeping Lion and North Ridge mountains under or in shade of boulders.

Creeping Cliffbrake (Pellaea intermedia Mett. ex Kuhn)--Native. Habitat: Dry rocky slopes near boulders of limestone and igneous rocks. Distribution at FDNHS: On slopes and cliffs of Sleeping Lion and North Ridge mountains under or in shade of boulders.

Eaton Lipfern (Cheilanthes eatonii Baker)--Native. Habitat: Igneous and limestone rocks and near boulders in thinly wooded and chaparral areas. Distribution at FDNHS: On slopes and cliffs of Sleeping Lion and North Ridge mountains under or in shade of boulders.

Wright Lipfern (Cheilanthes wrightii Hook.)--Native. Habitat: In crevices of igneous boulders and ledges in ravines and canyons. Distribution at FDNHS: On slopes and cliffs of Sleeping Lion and North Ridge mountains under or in shade of boulders.

Star Cloakfern (Notholaena standleyi Maxon)--Native. Habitat: On dry rock ledges and among boulders. Distribution at FDNHS: On slopes and cliffs of Sleeping Lion and North Ridge

mountains under or in shade of boulders.

PORTULACACEAE

Purslane (Portulaca oleracea L.)--Native. Habitat: On grassy slopes, dunes, and in salt marshes and dry soils of perennial pools. Distribution at FDNHS: On parade grounds and flat open areas.

Kiss-me-quick (Portulaca pilosa L.)--Native. Habitat: In gravelly or sandy soils on slopes and in arroyos. Distribution at FDNHS: On parade grounds, flat open areas, and parking area.

Orange Flameflower (Talinum aurantiacum Engelm.)--Native. Habitat: On rocky slopes of canyons and mountains. Distribution at FDNHS: On parade grounds, and flat open areas and along lower slopes of North Ridge mountain.

RANUNCULACEAE

Leather Flower (Clematis pitcheri var. pitcheri Torr. & Gray)--Native. Habitat: In thickets, open woodlands, along streams and in low places. Distribution at FDNHS: On fenceline on the north and east boundaries.

RHAMNACEAE

Texas Adolphia (Adolphia infesta (Kunth) Meisn.)--Native. Habitat: Arid slopes. Distribution at FDNHS: In dry stream bed in Hospital canyon.

Jujube (Ziziphus mauritiana Lam.)--Exotic. Habitat: Various. Distribution at FDNHS: Along maintenance road to Hospital Canyon.

Lotebush (Ziziphus obtusifolia (Hook. ex Torr. & Gray) Gray)--Native. Habitat: Various. Distribution at FDNHS: On banks of dry stream bed.

ROSACEAE

Southwestern Chokecherry (Prunus serotina Ehrh.)--Native. Habitat: In canyons and breaks of mountains. Distribution at FDNHS: In Hospital canyon.

RUBIACEAE

Scarlet Bouvardia (Bouvardia ternifolia (Cav.) Schlecht.)--Native. Habitat: In dry soil, on rimrock or among boulders in mountains. Distribution at FDNHS: On slopes of Sleeping Lion and North Ridge mountains.

Needleleaf Bluets (Houstonia acerosa ssp. acerosa (Gray) Gray ex Benth. & Hook. f.)--Native. Habitat: Sandy and rocky limestone slopes, crevices, and cliffs. Distribution at FDNHS: On slopes of Sleeping Lion and North Ridge mountains, and in Hospital canyon.

SALICACEAE

Eastern Cottonwood (Populus deltoides Bartr. ex Marsh)--Native. Habitat: Along watercourses. Distribution at FDNHS: In cottonwood grove at southeastern edge of FDNHS.

SAPINDACEAE

Mexican Buckeye (Ungnadia speciosa Endl.)--Native. Habitat: In rocky areas in canyons and on slopes and ridges. Distribution at FDNHS: On slopes of North Ridge mountain.

SCROPHULARIACEAE

Vandel Mecardon (Mecardonia procumbens (P. Mill.) Small)--Native. Habitat: In mud and water of ditches, lagoons, ponds, and streams and in moist soils of depressions. Distribution at FDNHS: In dry stream bed in Hospital canyon.

Beardlip Penstemon (Penstemon barbatus (Cav.) Roth)--Native. Habitat: Throughout. Distribution at FDNHS: On slopes of Sleeping Lion mountain.

Fendler Penstemon (Penstemon fendleri Torr. & Gray)--Native. Habitat: Calcareous, rocky, sandy soil. Distribution at FDNHS: On parade grounds, flat open areas, and meadows.

Snapdragon (Maurandella antirrhiniflora (Humb. & Bonpl. ex Willd.) Rothm.)--Native. Habitat: On shrubs and boulders, beach areas, dry salt marshes, also limestone hills and on bluffs. Distribution at FDNHS: On shrubs on flat areas and lower slopes of North Ridge mountain.

Wholeleaf Paintbrush (Castilleja integra Gray)--Native. Habitat: Dry gravelly soil on hills and plains. Distribution at FDNHS: In flat open areas of parade grounds and meadows near Sleeping

Lion mountain.

Texas Toad Flax (Nuttallanthus texanus (Scheele) D.A. Sutton)--Native. Habitat: In sandy soils in fields, open woods, and grassy pinelands. Distribution at FDNHS: In dry stream bed in Hospital canyon.

SOLANACEAE

Heartleaf Ground-Cherry (Physalis hederifolia Gray)--Native. Habitat: Desert plains and mountains, sandy areas and sometimes open woods. Distribution at FDNHS: Near hospital building, flat surrounding areas, and moist areas.

Lobed Ground-cherry (Quincula lobata (Torr.) Raf.)--Native. Habitat: Various habitats. Distribution at FDNHS: In parade grounds, and in disturbed ground.

Woolly False Nightshade (Chamasaracha villosa Rydb.)--Native. Habitat: In gravelly-sandy soil along streams. Distribution at FDNHS: Disturbed ground around maintenance road.

Silver-leaf Nightshade (Solanum eleagnifolium Cav.)--Native. Habitat: In dry sterile soils in open woods, prairies, waste places, and disturbed soils. Distribution at FDNHS: In flat open areas, near buildings, and in disturbed soils along dry stream bed.

Buffalo-bur (Solanum rostratum Dunal)--Native. Habitat: Over-grazed land, flats, and waste

places. Distribution at FDNHS: In dry stream bed in Hospital canyon.

Jimson-weed (Datura wrightii Regel)--Native. Habitat: In loose sand and on floodplains and bottomlands. Distribution at FDNHS: In dry stream bed in Hospital canyon.

Fiddle-Leaf Tobacco (Nicotiana repanda Willd. ex Lehm.)--Native. Habitat: In sandy or clayey soils along streams, on flats and in depressions, shelter of boulders, thickets, and wooded ravines.

Distribution at FDNHS: Near buildings, and in disturbed ground.

ULMACEAE

Net-leaf Hackberry (Celtis laevigata var. reticulata (Torr.) L. Benson)--Native. Habitat: Limestone hills and in arroyos, and along watercourses. Distribution at FDNHS: In Hospital canyon.

VERBENACEAE

New Mexico Verbena (Verbena neomexicana (Gray) Small)--Native. Habitat: Pine-oak forests, stream beds, gravel and sand bars, streamsides, and rocky hillsides. Distribution at FDNHS: Open flat areas and parade grounds.

Wright Verbena (Glandularia wrightii (Gray) Ueber)--Native. Habitat: Fields, flats, dry gravelly creek beds and bars, dry or semidesert hillsides and slopes. Distribution at FDNHS: In

dry stream bed, along maintenance areas, and open flat areas; ubiquitous.

Frogfruit (Phyla nodiflora (L.) Greene)--Native. Habitat: Wet or moist soil, fields, clearings, hillsides, ditches, thickets, and beaches. Distribution at FDNHS: Cottonwood picnic area, and disturbed walkways with moist ground.

Oreganillo (Aloysia wrightii Heller *ex* Abrams)--Native. Habitat: Rocky slopes, banks, ledges, arroyos, gullies, limestone hills, mesa slopes, and desert scrub. Distribution at FDNHS: On slopes of Sleeping Lion mountain.

Texas White-brush (Aloysia gratissima (Gill. & Hook.) Troncoso)--Native. Habitat: Rock outcrops, desert grasslands, low places, rocky creek-beds, dry washes, rocky bluffs. Distribution at FDNHS: In dry stream beds, and on slopes of Sleeping Lion and North Ridge mountains.

VISCACEAE

Mistletoe (Phoradendron villosum ssp. coryae (Trel.) Wiens)--Native. Habitat: Parasitic on Quercus. Distribution at FDNHS: In Quercus regardless of tree location.

ZYGOPHYLLACEAE

Warty Caltrop (Kallstroemia parviflora J.B.S. Norton)--Native. Habitat: Limestone soils. Distribution at FDNHS: Dry stream bed in plenty of shade in Hospital canyon.

Puncture-vine (Tribulus terrestris L.)--Exotic. Habitat: In sandy or gravelly disturbed soils.

Distribution at FDNHS: In disturbed ground in flat, open, bare, areas.