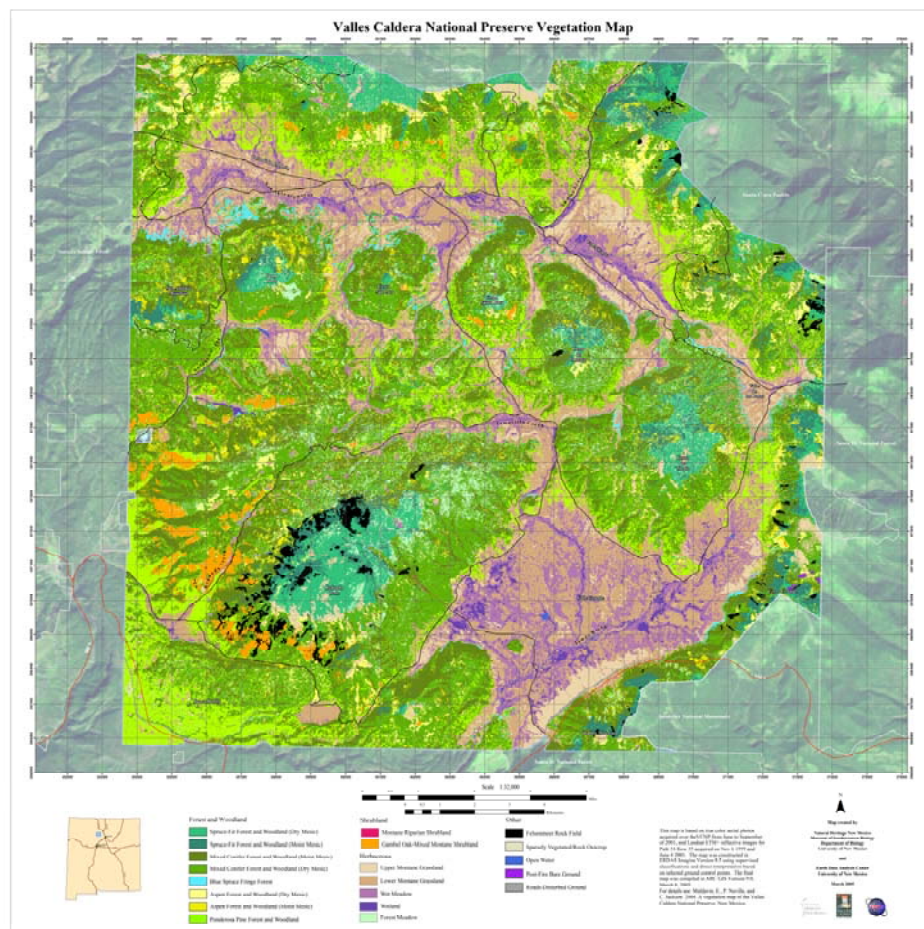


A Vegetation Map of the Valles Caldera National Preserve, New Mexico



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SUMMARY

To support the management and sustainability of the ecosystems of the Valles Caldera National Preserve (VCNP), a map of current vegetation was developed. The map was based on aerial photography from 2000 and Landsat satellite imagery from 1999 and 2001, and was designed to serve natural resources management planning activities at an operational scale of 1:24,000. There are 20 map units distributed among forest, shrubland, grassland, and wetland ecosystems. Each map unit is defined in terms of a vegetation classification that was developed for the preserve based on 348 ground plots. An annotated legend is provided with details of vegetation composition, environment, and distribution of each unit in the preserve. Map sheets at 1:32,000 scale were produced, and a stand-alone geographic information system was constructed to house the digital version of the map. In addition, all supporting field data was compiled into a relational database for use by preserve managers.



Cerro La Jarra in Valle Grande of the Valles Caldera National Preserve

(Photo: E. Muldavin)

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INTRODUCTION

The Valles Caldera National Preserve was established in 2000 to protect and manage nearly 89,000 acres (36,000 ha) of wildlands in northern New Mexico that are rich in natural resources and biodiversity. To support the management and sustainability of the preserve's ecosystems, a map of current vegetation was developed and is presented here. The mapping project was initiated in 2001 with a preliminary ecological assessment and vegetation survey to support the mapping process (Muldavin and Tonne 2003). In the first year, 101 vegetation plots were collected to quantitatively define the vegetation classification and to provide ground control for map development. At the same time, a digital ortho-rectified aerial photography and Landsat satellite imagery were processed and compiled into a geographic information system (GIS) in preparation for subsequent mapping. In 2002, an additional 268 plots were collected for a total of 369 ground control points. These were used in a mapping strategy that combined automated digital image classification of aerial photography/satellite imagery and direct image interpretation. The final map was designed to serve natural resources management planning activities at an operational scale of 1:24,000.

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STUDY AREA

The Valles Caldera National Preserve (VCNP) lies in north-central New Mexico in the heart of the Jemez Mountains (Figure 1). It is bounded primarily by Santa Fe National Forest lands with smaller units of Bandelier National Monument and Santa Clara Pueblo along its eastern flank. The preserve encompasses most of the original Baca Location No. 1 land grant except for the peripheral areas owned by the U.S. Forest Service (USFS), Bandelier NM, and Santa Clara Pueblo. The acreage is approximately 89,000 acres (36,000 ha). For more details on the history and landscape of the VCNP, see Muldavin and Tonne (2003).

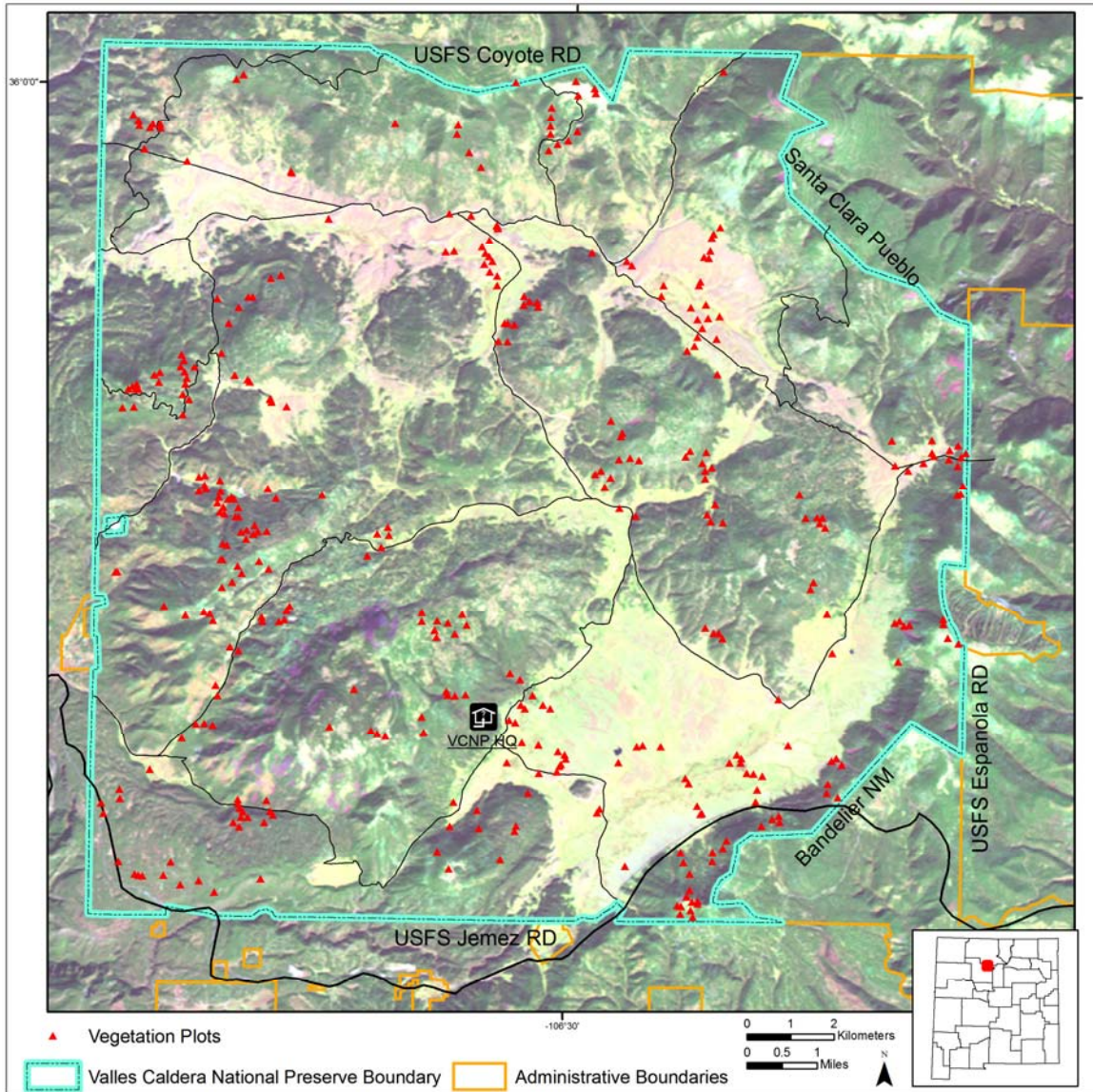


Figure 1. Valles Caldera National Preserve (VCNP) study area encompasses most of former Baca Location No. 1 (white) except for areas that were distributed to Bandelier National Monument, Santa Clara Pueblo, and the Coyote District of the Santa Fe National Forest.

MATERIALS AND METHODS

Vegetation Sampling and Classification

Over the course of two field seasons, 369 vegetation plots were collected to serve the purposes of vegetation classification and map development (a list of plots and locations is provided in Appendix A). The first year of sampling was focused on generating plots for developing the vegetation classification (see Muldavin and Tonne 2003). Hence, most 2001 plots were standard NHNM plots with complete floristic inventories and site characterization (101 plots). The second year was oriented towards maximizing the distribution of ground controls points to aid the mapping process. These ground control plots (268) contained only data sufficient to classify the plot to the plant association (dominant species and major site variables such as slope, aspect, and elevation). The details of plot data collection are provided in Muldavin and Tonne (2003).

Plots were distributed in such a way as to maximize the coverage of as many habitats as possible but within the logistical constraints of the preserve's rugged terrain. Using the digital ortho-rectified aerial photography in a GIS, polygons of homogeneous vegetation were identified and targeted for sampling if they were reasonably accessible by roads and trails and within a day's hike. Plots were most commonly located in "landscape clusters" whereby plots would be optimally distributed in such a way as to represent the local vegetation pattern and geomorphic configuration. For example, within a watershed patches of homogenous vegetation on north versus south slopes might be sampled along with that in the drainages or the ridgelines.

All vegetation and site data were entered into a Microsoft Access database and quality controlled through error checking computer routines and manual read-backs. A table of all plots, their plant association classification, and location is provided in Appendix A. An updated species list is provided in Appendix B. The databases along with complete records for all plots are provided in a Data Addendum on CD.

Muldavin and Tonne (2003) developed a preliminary vegetation classification for the preserve based on the 2001 data. This classification was updated by using the additional data from 2002 and reanalyzing the entire dataset using detrended correspondence analysis (DCA) and standard tabular comparison techniques (Mueller-Dombois and Ellenberg 1974). The updated vegetation classification is provided in Appendix C.

Map Development

The vegetation map was developed using a strategy that combined and automated digital image classification of aerial photography and satellite imagery along with direct analog image interpretation. Initially, the aerial photography and satellite imagery were processed and entered into a GIS along with ancillary spatial layers. Then a series of automated unsupervised and supervised classifications was conducted followed by fine-scale map refinement using direct image interpretation .

Aerial Photography Processing

As a first step in the mapping process, a digital ortho-rectified aerial photo image was constructed based on 267 natural-color aerial photographs over VCNP from June to September, 2001. These photographs were scanned into a digital image format with three bands (Band 1 displaying visible red reflectance, Band 2 displaying visible green reflectance, and Band 3 displaying visible blue reflectance) and at an 800-dpi pixel resolution. The ortho-rectification process combines the film geometry, camera geometry and ties it to the horizontal coordinate system and elevation through the solution of three co-linear equations. In this case the camera geometry was defined by the camera report that came with the project and tied to the film by the eight fiducial points located on each photo frame. Each frame was then tied to the ground by locating nine distinctly separated Ground Control Points (GCPs) on a one-meter spatial resolution panchromatic (black and white) USGS Digital Ortho-photo Quarter Quad (DOQQ) acquired over the area in 1996. Simultaneously, the elevation at the GCPs was also entered from the USGS ten-meter spatial resolution Digital Elevation Model (DEM). Using this process these photos were rectified to a 0.5-meter spatial resolution in a Universal Transverse Mercator projection, Zone 13, Clarke 1866 Spheroid, 1927 North American Datum.

The outcome was 267 ortho-rectified photos over the VCNP that were map-oriented and usable in a GIS, with each covering approximately 13 square kilometers (5 square miles). In order to display the whole study area as one image, the ortho-photos were then combined into one ortho-photo mosaic. To produce a seamless and uniform mosaic with minimum distortion several processing steps were required. To minimize radial illumination distortion (due to the ground directly underneath the camera reflecting the most back to the film causing a hot spot, and the edges reflecting back less making them darker), a contrast balance algorithm was applied to each photo. To minimize geometric distortion, the area used in each photo was limited to as close to the center as possible while still allowing overlap with the next photo. There can also be differences in solar illumination from photo to photo because each flight line is acquired at a different time, resulting in different intensity and shadowing. In this case, there were several months between some lines that not only also generated strong differences among photos due to differential cloud cover and shadows but also vegetation phenology changes (greenness differences). To compensate for this, the flight lines were matched by spectral histograms to minimize contrast, and then feathered together in the overlap zone. The feathering process was particularly good at reducing the contrast across the mosaic as a whole, but there can be ghosting of images in the overlap zone, particularly in places where the trees appear at different angles between photos.

The resulting mosaic 0.5-m spatial resolution generated a very large digital file (approximately three gigabytes). While desirable for photo-interpretation, a file of this size is unwieldy and overly detailed for use in the follow-on automated classification process, and even simple processes such as displaying it in a viewer become cumbersome. Therefore, the mosaic was resampled down to a two-meter resolution, which reduced the size of the file by eight times and also helped to mute some of the remaining contrast problems. The two-meter mosaic was then subjected to a simple unsupervised, color-clustering image analysis in ERDAS Imagine software to create three functional group classes – forest, grassland, and wetland. These classes

were then used as masks to create separate images used in subsequent image classifications (i.e., separate maps stratified by forest, grassland and wetlands).

Satellite Image Processing

To aid in the vegetation mapping process, two multi-spectral satellite Landsat Enhanced Thematic Mapper⁺ (ETM⁺) images were also used. The advantages and disadvantages of using Landsat imagery are almost the opposite of using air photos; ETM⁺'s spatial resolution (30 meters) is much coarser than that of the air photo, but ETM⁺'s spectral resolution covers the near and mid-infrared wavelengths which are important regions for differentiating vegetation and the underlying soil reflectance responses (Table 1). In addition, reflectance is much more uniform across the image than with ortho-mosaic photography. For the VCNP, two images were acquired from November 6, 1999 and June 4, 2001 to emphasize phenological differences across the seasons; for example, both deciduous (aspens and oaks) and coniferous (pines and firs) trees will be green in the June image, but only the conifers will be green in the November image. In addition, the years 1999 and 2001 bracket the Cerro Grande fire to help identify the fire damage.

Table 1. Landsat ETM+ band descriptions (Jensen, 2004).

Landsat Band	Wavelength (µms)	Surface Response
Band 1	Visible Blue (0.45-0.52)	Absorption by most materials except saline or sandy soils.
Band 2	Visible Green (0.52-0.6)	Minor green vegetation reflectance peak.
Band 3	Visible Red (0.63-0.69)	Green vegetation absorption, but senescent vegetation reflectance and iron-stained soils reflect in these wavelengths.
Band 4	Near-Infrared (0.76-0.9)	Green vegetation reflectance peak.
Band 5	Mid-Infrared (1.55-1.75)	Woody vegetation has less reflectance than herbaceous vegetation due to shadowing.
Band 7	Mid-Infrared (2.08-2.35)	Hydrated vegetation, wet soil, and clayey soils have strong absorption features in these wavelengths.

Although the ETM⁺ images were already geo-corrected, they were rectified again using the ortho-photo mosaic as a base to insure that the images overlaid directly onto the same sites in the ortho-photos; the ETM⁺ images were also resampled to a 2 m spatial resolution. The images were projected into the same projection as the ortho-photos.

Band Ratioing

In addition to the spectral bands, several vegetation indices were computed to enhance various vegetation or ecosystem characteristics. The four indices used were the Normalized Difference Senescent Vegetation Index (NDSVI) [Eq. 1], the Normalized Difference Vegetation Index (NDVI) [Eq. 2], a moisture index [Eq. 3], and a canopy structure index [Eq. 4]. These were computed as follows:

$$\text{NDSVI} = ((\text{Band 7} - \text{Band 3}) / (\text{Band 7} + \text{Band 3}) + 1) * 100 \quad (\text{Eq. 1})$$

$$\text{NDVI} = ((\text{Band 4} - \text{Band 3}) / (\text{Band 4} + \text{Band 3}) + 1) * 100 \quad (\text{Eq. 2})$$

$$\text{Moisture index} = ((\text{Band 5} - \text{Band 7}) / (\text{Band 5} + \text{Band 7}) + 1) * 100 \quad (\text{Eq. 3})$$

$$\text{Structure index} = ((\text{Band 4} - \text{Band 5}) / (\text{Band 4} + \text{Band 5}) + 1) * 100 \quad (\text{Eq. 4})$$

Band ratios, in general, are designed to divide a reflectance peak against an absorption low for unique surface features. Due to the potential differences between image data ranges, the difference between bands is normalized against the total data range of the image bands. The adding of “1” and multiplying by “100” in each equation takes the original result which would be a positive or negative fractional value centered around 0 and turns it into a positive integer value centered around 100. The NDSVI enhances the spectral differences of senescent vegetation (specifically grasses) that have a relatively low reflectance response in the red wavelengths and a high reflectance in the mid-infrared wavelengths. The NDVI emphasizes vigorous green plant growth by ratioing a strong chlorophyll reflectance in the near-infrared wavelengths against chlorophyll absorption in the visible red wavelength (Jensen, 2000). The moisture index ratios relies on the relatively high reflectance values in the shorter wavelength part of the mid-infrared against strong absorption at the longer wavelength end of the mid-infrared by water molecules found in soil and vegetation (Jensen, 2000). The structure index enhances shadowing and leaf water content in plants (Jensen, 2000).

Texture Image

As noted above, the ortho-photos have limited spectral value due to image modifications in the creation of the ortho-mosaic, but they do provide valuable spatial detail. To analytically quantify this spatial detail a texture analysis conducted that enhances the amount of spectral change between neighboring image cells. In this case, a texture image was derived by averaging variance images representing three different scales or kernel sizes (3x3 cells - 36 m², 5x5 cells – 100 m², and 7x7 cells – 196 m²). The variance image was computed as shown in Equation 5:

$$\text{Variance image} = \Sigma ((x - M)^2 / (n-1)) \quad (\text{Eq. 5})$$

where **x** is the value of a particular pixel, **M** is the mean value for the moving window kernel, and **n** is the kernel size (Leica, 2003). The lower the variance, the smoother the image is in the local area of the kernel, and vice versa, high variance represents roughness or boundaries.

Final Image Compilation

All of the source and derived layers were then compiled into a single image re-sampled to a two-m spatial resolution. This created a final image with 18 image bands, as listed in Table 2, and was necessary in order to make all of these bands available to the classification process.

Table 2. Image file setup for images used in classification.

Image Bands	Band Description
Band 1	Air Photo Visible Red Wavelengths
Band 2	Air Photo Visible Green Wavelengths
Band 3	Air Photo Visible Blue Wavelengths
Band 4	Air Photo Texture
Band 5	November 6 1999 Landsat Near-Infrared
Band 6	November 6 1999 Landsat Mid-Infrared
Band 7	November 6 1999 Landsat Mid-Infrared
Band 8	June 4 2001 Landsat Near-Infrared
Band 9	June 4 2001 Landsat Mid-Infrared
Band 10	June 4 2001 Landsat Mid-Infrared
Band 11	November 6 1999 NSVDI
Band 12	November 6 1999 NDVI
Band 13	November 6 1999 Moisture
Band 14	November 6 1999 Structure
Band 15	June 4 2001 NSVDI
Band 16	June 4 2001 NDVI
Band 17	June 4 2001 Moisture
Band 18	June 4 2001 Structure

Image Classification

The image classification procedure synthesizes satellite image data, field plot data, and ancillary data derived principally from GIS layers. A supervised classification strategy was adopted to create the vegetation map based on vegetation community types. This strategy develops spectral classes based on ground locations with known characteristics such as vegetation composition and landscape context.

In a supervised classification strategy, the field data are applied to the image data through an interactive process called “seeding.” In the seeding process, a two-meter image pixel at the field plot location was selected and its spectral characteristics were used to gather other similar contiguous pixels to create a statistical model or “seed” of the field plot. The seeding algorithm (Eq. 6) searches around that point within user-defined parameters that contain a seed within: 1) a certain distance, 2) a certain area, and 3) a certain spectral distance defined as:

$$SD = \sqrt{\sum(\mu - X)^2} \text{ (Eq. 6),}$$

where **SD** is the spectral distance between a new pixel and the mean of the current seed group pixels across all bands, μ is the mean of the seed pixel group for each image band, and **X** is the spectral value of the new pixel for each band (Leica, 2003).

In an iterative process, we constructed the best seed models by adjusting the parameters and comparing the resulting pixel distributions against the terrain models and the original

imagery. A seed was developed for each field plot using the plot GPS location and associated field information. The seed's maximum area was initially defined by the size of the vegetation community occurrence as determined in the field. The actual seed was then defined by increasing the spectral distance iteratively until the spectral signature collected within the seed generated a covariance matrix that could be inverted, a requirement for the maximum likelihood decision rule used later in the actual classification.

The seed shape and location were checked against field notes and maps, and by direct interpretation of the seed in the image on the screen, in conjunction with the terrain models. Each seed was saved in a signature file with its field plot number, mean values for each image band, variance, number of pixels that were used to create the seed, and minimum and maximum values.

Statistics gathered in the seeding process were used to perform a supervised classification. Supervised classifications are based on a maximum likelihood decision rule containing a Bayesian classifier that uses probabilities to weight the classification towards particular classes. In this study, the probabilities were unknown, so the maximum likelihood equation (Eq. 7) for each of the classes is given as:

$$D = [0.5\ln(\text{cov}_c)] - [0.5(X - M_c)^T * (\text{cov}_c^{-1}) * (X - M_c)] \text{ (Eq. 7)},$$

where **D** is the weighted distance, **cov_c** is the covariance matrix for a particular class, **X** is the measurement vector of the pixel, **M_c** is the mean vector of the class and ^T is the matrix transpose function (Leica, 2003). Each pixel is then assigned to the class with the lowest weighted distance. This technique assumes the statistical signatures have a normal distribution.

This decision rule is considered the most accurate, because it not only uses a spectral distance (as the minimum distance decision rule), but it also takes into account the variance of each of the signatures. The variance is important when comparing a pixel to a signature representing, for example, a grassland community, which might be fairly homogeneous, to a forest class, which is more heterogeneous.

To locate problems, informal accuracy checking was used based on field data, air photos, personal knowledge of a site and other ancillary data. If a distribution problem with a seed was detected, the seed was rechecked to insure it was properly modeling the vegetation type and landscape. This preliminary map had as many map classes as seeds used to develop it.

Final Map Units

Once the image was classified, the seed classes representing the various plant associations of the preserve were grouped into operational map units based on two criteria. Either they were grouped ecologically into map units that were appropriate for land management at the target scale of 1:24,000, or they were grouped because they were spatially or spectrally so similar that they were not differentiable with confidence at the target scale. Hence, most map units were represented by sets of plant associations that are separated into primary components

(dominant plant associations comprising the majority of a map unit), secondary components (other plant associations with significant coverage), and potential inclusions (plant associations estimated to have less than 10% coverage within the unit). Map unit descriptions were then developed describing the composition and distribution of each unit (see Appendix C for a list of plant associations used in the map unit descriptions).

Fine-scale Image Interpretation

Mapping in areas of high relief and with a complex vegetation mosaic such as that at VCNP can pose significant mapping problems, particularly in areas of deep shadows and narrow linear features (e.g., narrow bands of wetland and riparian vegetation). In addition, while the supervised approach was suitable for analyzing large homogeneous patches of relatively uniform spectral response, the two-meter resolution of the imagery often led to small patches and a rather heterogeneous classification pattern driven by small differences in spectral response, e.g., individual trees or shrubs might be classified as one thing while the intervening grassland matrix might be classified as another. Therefore, using the supervised classification as a foundation, the map was refined using direct image interpretation of the aerial photos supported by the various special analysis layers and ancillary information such as ground-based mapping and photos.

As a first step, a filtering process was applied to create a minimum map unit polygon size of 36 m² (approximately 3 pixels by 3 pixels or 6 m x 6 m). The procedure eliminates the “speckle” created by spatially solitary delineations. The eliminated areas were then filled with the majority MU found in the surrounding cells. While the specified minimum map unit size was 5,000 m² (0.5 ha), the higher resolution was maintained at the request of the VCNP land management staff.

Of particular issue was the distribution of aspen among mixed conifer and spruce-fir forests. To increase the accuracy of the aspen distribution, a stepwise multiple regression model between image layers and percent aspen cover from ground plots was developed. The resulting equation had a R² of 0.605, and was used to create a total aspen coverage image with values representing percentage cover of aspen within each pixel. Similarly, a complementary conifer image was created. These layers were used to complement the aerial photo interpretation-driven refinement of aspen distribution.

The determination of dry-mesic versus moist-mesic vegetation communities was done through a combination of image interpretation and the application of a solar irradiance-terrain model based on the 30-meter DEM. Using the DEM, a solar irradiance model was developed by integrating an hourly time-step model of solar irradiance per pixel of the DEM for each month in watts/meter/hour and then averaging each month to create an annual average model (Fu and Rich, 2000). The higher the value the warmer, and presumably drier, the site. In addition, a topographic curvature image was created using the second derivative of the DEM. This generates positive values for convex features such as hills or ridges and negative ones for concave features such as drainages and valleys. For our purposes, this model represents where water was being shed off ridges and upper slopes versus being accumulated in draws and hollows. Since the curvature and the solar irradiance models had very different dynamic ranges, in order to use them together they were rescaled as relative values ranging from 0 to 255

(histogram stretched to an eight-bit image). They were then averaged together to represent a general term of moisture availability. In the resulting combined model a threshold between dry and moist mesic sites was empirically determined based on ground data and aerial photo interpretation and applied as a classifier of dry mesic versus moist mesic forest communities.

Finally, a stream accumulation image was derived from the DEM. The stream accumulation approach evaluates each pixel's elevation and finds how many pixels drain into it, if any. The larger the resulting image's pixel value the more of a watershed that drains into the pixel. The stream accumulation image was used to identify where montane riparian corridors existed and then these were integrated into the image.

No attempt was made to classify buildings, pavement, concrete, or lawns due to the heterogeneity of reflecting surfaces. Roads in vector format were placed directly onto the map to provide for their classification.

The final map along with a plot location and ancillary data layers necessary for output of the vegetation map was incorporated into an ArcGis project file and delivered directly to VCNP. It was also copied to the accompanying Data Addendum CD.

VALLES CALDERA NATIONAL PRESERVE VEGETATION MAP

The final version of Valles Caldera Vegetation Map was produced as a single map sheet at 1:32,000 scale to accompany this report. A reduced version of the map is shown in Figure 2. There are 20 map units as outlined in Table 3 with their associated aerial coverage. For each map unit, the primary and secondary component plant associations are listed along with inclusions (see Appendix C for the vegetation classification and a list of plant associations for the preserve). Primary components are those plant associations that together comprise the majority of the unit. Secondary components are minor associations that can occupy at least 10% of the unit, but are not the dominants. Inclusions are associations that occupy less than 10% of the area. An annotated legend with detailed map unit descriptions follows. The descriptions are grouped by Forest and Woodland, Shrubland (montane shrublands and riparian shrublands), and Herbaceous vegetation (grasslands and herbaceous wetlands). Cover definitions criteria are provided for each map unit, along with information on distribution within the preserve.

Table 3. Map units of the Valles Caldera National Preserve Vegetation Map (2005).

Unit No.	Map Unit	Ha	Acres	%
1 & 2	Spruce-Fir Forest	2835	7005	7.89
1	Spruce-Fir Forest and Woodland (Dry Mesic)	1742	4304	4.85
2	Spruce-Fir Forest and Woodland (Moist Mesic)	1093	2701	3.04
4, 5 & 7	Mixed Conifer Forest and Woodland	14798	36566	40.41
4	Mixed Conifer Forest and Woodland (Dry Mesic)	8834	21829	24.59
5	Mixed Conifer Forest and Woodland (Moist Mesic)	5651	13963	15.73
7	Blue Spruce Fringe Forest	313	774	0.87
10 & 11	Aspen Forest and Woodland	2065	5103	5.75
10	Aspen Forest and Woodland (Dry Mesic)	1297	3204	3.61
11	Aspen Forest and Woodland (Moist Mesic)	768	1899	2.14
13	Ponderosa Pine Forest	3739	9241	10.41
14	Gambel Oak-Mixed Montane Shrubland	584	1443	1.63
16, 17 & 3	Montane Grassland	8035	19858	22.37
16	Upper Montane Grassland	1996	4933	5.56
17	Lower Montane Grassland	5111	12631	14.23
3	Forest Meadow	928	2294	2.58
19 & 20	Wetlands and Wet Meadows	2773	6853	7.72
19	Wet Meadow	2360	5832	6.57
20	Wetland	413	1021	1.15
21	Montane Riparian Shrubland	6	14	0.02
24	Sparsely Vegetated Rock Outcrop	64	159	0.18
25	Felsenmeer Rock Field	370	915	1.03
26	Roads-Disturbed Ground	622	1536	1.73
27	Open Water	23	56	0.06
28	Post-Fire Bare Ground	7	17	0.02
Total		35922	88765	100.00

Valles Caldera National Preserve Vegetation Map



Forest and Woodland

- Spruce-Fir Forest and Woodland (Dry Mesic)
- Spruce-Fir Forest and Woodland (Moist Mesic)
- Mixed Conifer Forest and Woodland (Moist Mesic)
- Mixed Conifer Forest and Woodland (Dry Mesic)
- Blue Spruce Fringe Forest
- Aspen Forest and Woodland (Dry Mesic)
- Aspen Forest and Woodland (Moist Mesic)
- Ponderosa Pine Forest and Woodland

Shrubland

- Montane Riparian Shrubland
- Gambel Oak-Mixed Montane Shrubland
- Upper Montane Grassland
- Lower Montane Grassland
- Wet Meadow
- Forest Meadow

Herbaceous

- Upper Montane Grassland
- Lower Montane Grassland
- Wet Meadow
- Forest Meadow

Other

- Felsenmeer Rock Field
- Sparsely Vegetated Rock Outcrop
- Open Water
- Post-Fire Bare Ground
- Roads-Disturbed Ground

This map is based on true color aerial photos acquired over the VCNP from June to September of 2001, and Landsat ETM+ reflective images for Path 34 Row 35 acquired on Nov 6, 1999 and June 4, 2001. The map was constructed in ERDAS Imagine Version 8.5 using supervised classifications and direct interpretation based on selected ground control points. The final map was compiled in ArcGIS Version 9.0, March 8, 2005. For details see: Muldavin, E., P. Neville, and C. Jackson. 2004. A vegetation map of the Valles Caldera National Preserve, New Mexico.

Map created by
 Natural Heritage New Mexico
 Museum of Southwestern Biology
 Department of Biology
 University of New Mexico
 and
 Earth Data Analysis Center
 University of New Mexico
 March 2005



Figure 2 Vegetation map of Valles Caldera National Preserve, New Mexico. Original scale 1:32,000.

ANNOTATED LEGEND

Forests and Woodlands

Vegetation dominated by trees over 5 m tall.

Rocky Mountain Spruce-Fir Forest

High-elevation conifer forests dominated by Engelmann spruce (*Picea engelmannii*) and corkbark fir (*Abies lasiocarpa* var. *arizonica*). Other conifers may be present but clearly subordinate or successional (not reproducing). Aspens (*Populus tremuloides*) are also common to abundant successional trees.


<i>Spruce-Fir Forest and Woodland</i> <i>(Dry Mesic)</i>	1	
Ha: 1,742	Acres: 4,304	
Primary Components: Corkbark fir /Whortleberry Engelmann Spruce/Whortleberry Corkbark Fir/Moss Forest Engelmann's Spruce/Moss		
Secondary Components: Engelmann Spruce-Rocky Mountain Maple Engelmann Spruce/Common Juniper Engelmann Spruce/Parry's Danthonia Engelmann Spruce/Parry's Thurber Fescue		
Inclusions: Limber Pine/Common Juniper Quaking Aspen/Whortleberry		
Summary: Elevations typically range from 9,500 to 11,250 ft (2,900 to 3,430 m). Stands occur on cold, mid to upper slopes and ridges on northerly aspects; lower slopes to ridges on southerly aspects. Shrubs and subshrubs typically dominate, but on the coldest sites most vascular vegetation is replaced by soil mosses. Grassy understories occasionally occur adjacent to upper montane grasslands.		

Figure 3. Subalpine Fir/Whortleberry Forest along the San Antonio Rim at 10,000 ft (plot: 01VC055; photo: P. Tonne)

<i>Spruce-Fir Forest and Woodland (Moist Mesic)</i>		2
Ha: 1,093	Acres: 2,701	
Primary Components: Corkbark Fir/Sprucefir Fleabane Engelmann Spruce/Sprucefir Fleabane Engelmann Spruce-Rocky Mountain Maple		
Secondary Components: Engelmann Spruce/Dryspike Sedge Engelmann Spruce/Fringed Brome		
Inclusions: Subalpine Fir/Whortleberry Engelmann's Spruce/Whortleberry Quaking Aspen/Sprucefir Fleabane		
Summary: Elevations typically range is from 9,000 to 10,500 ft (2,750 to 3,200 m). Stands occur on cold, mid to lower slopes on northerly aspects, and occasionally in lower slope coves of southerly aspects. The understory is dominated by herbs and can be diverse and luxuriant in cover. With the exception of Rocky Mountain maple, shrubs and subshrubs are typically poorly represented. Grassy understories occasionally occur adjacent to upper montane grasslands		



Figure 4. Engelmann Spruce/Sprucefir Fleabane Forest along the rim northwest of Canada Bonita at about 9,300 ft (Plot: 01VC093; photo: E. Muldavin).

Rocky Mountain Aspen Forest and Woodlands

Broadleaf forests dominated by aspen (*Populus tremuloides*) that occur between 8,600 to 10,200 ft (2,630 to 3,110 m). Conifers can be common, particularly as reproduction in the understory, but do not exceed 25% of canopy cover. Stands are typically considered successional to high-elevation mixed conifer or spruce-fir forests following fire, but clonal aspen forests can be long-lived and occupy a site for long periods, particularly with repeated burning.

Aspen Forest and Woodland (Dry Mesic)		10
Ha: 1,297	Acres: 3,204	
Primary Components: Quaking Aspen/Whortleberry Quaking Aspen/Thurber Fescue		
Secondary Components: Quaking Aspen /Fringed Brome		
Inclusions: Gambel Oak-New Mexico Locust/Meadow-rue Engelmann Spruce/Whortleberry		
Summary: Elevations typically range from 8,600 to 10,200 ft (2,630 to 3,110 m). Stands occur on cold, mid to upper slopes and ridges on northerly aspects; lower slopes to ridges on southerly aspects. Shrubs and subshrubs typically dominate, but on the coldest sites soil mosses replace most vascular vegetation. Grassy understories occasionally occur adjacent to upper montane grasslands.		



Figure 5. Quaking Aspen/Thurber Fescue along the Valle San Antonio rim at about 10,000 ft (plot: 01VC015; photo: Y. Chauvin).


<i>Aspen Forest and Woodland (Moist Mesic)</i>		11
Ha: 768	Acres: 1,899	
Primary Components: Quaking Aspen/Fendler's Meadow-rue Quaking Aspen/Sprucefir Fleabane		
Secondary Components: Quaking Aspen /Fringed Brome		
Inclusions: Gambel Oak-New Mexico Locust/Meadow-rue Engelmann Spruce/ Sprucefir Fleabane		
Summary: Elevations typically range from 8,700 to 9,500 ft (2,650 to 2,900 m). Stands occur on mid to lower slopes on northerly aspects, and occasionally in lower slope canyon bottoms and coves of southerly aspects. The understory is dominated by herbs and can be diverse and luxuriant in cover. With the exception Rocky Mountain maple, shrubs and subshrubs are typically poorly represented. Grassy understories occasionally occur adjacent to montane grasslands.		



Figure 6. Quaking Aspen/Fendler's Meadow-rue Woodland along Pajarito Rim at about 9,100 ft (plot: 01VC071; photo: P. Tonne).

Rocky Mountain Mixed Conifer Forest

Forests of mid elevations (8,500 to 10,000 ft; 2,600 to 3,050 m) codominated by a combination of firs and pines: Douglas-fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*), blue spruce (*Picea pungens*), southwestern white pine (*Pinus strobiformis*), limber pine (*Pinus flexilis*), and ponderosa pine (*Pinus ponderosa*). Ponderosa is typically successional and not reproducing. Aspens are also common to abundant successional trees. Blue spruce can form nearly pure stands on the margins of valle grasslands (map unit 7). Engelmann spruce and corkbark fir are absent or clearly subordinate (< 25% of the conifer canopy cover).

<i>Mixed Conifer Forest and Woodland</i> <i>(Dry Mesic)</i>		4
Ha: 8,834	Acres: 21,829	
Primary Components: White Fir-Douglas-fir/Oregongrape Abies concolor/Carex rossii White fir-Douglas-fir/Common Juniper Picea pungens/Juniperus communis		
Secondary Components: Douglas-fir/Fringed Brome White Fir- Douglas-fir/Bigtooth Maple White Fir-Douglas-fir/Thurber Fescue		
Inclusions: White Fir-Douglas-Fir/Gambel Oak White Fir-Douglas-fir/Whortleberry Quaking Aspen/Thurber Fescue		
Summary: Elevations typically range from 8,300 to 10,000 ft (2,540 to 3,050 m). Stands occur on mid to upper slopes and ridges on northerly aspects; lower slopes to ridges on southerly aspects. Shrubs and subshrubs typically dominate, but grassy understories occasionally occur adjacent to upper montane grasslands.		
		
		<p>Figure 7. White Fir-Douglas-fir/Oregongrape Forest along Redondo Border in upper Freelove Canyon at about 9,400 ft (plot: 01VC029; photo: E. Muldavin).</p>

Mixed Conifer Forest and Woodland (Moist Mesic)		5
Ha: 5,651	Acres: 13,963	
Primary Components: White Fir/Sprucefir Fleabane Forest White Fir- Douglas-fir/Fendler's meadow-rue White Fir- Douglas-fir/Bigtooth Maple White Fir/Dryspike Sedge Blue Spruce/Dryspike Sedge Forest White Fir-		
Secondary Components: White Fir/Cliffbush White Fir-Douglas-Fir/Gambel Oak White Fir-Douglas-fir/Fringed Brome Douglas-fir/Whortleleaf Snowberry		
Inclusions: White Fir-Douglas-fir/Thurber Fescue Quaking Aspen/Fendler's meadow-rue		
Summary: Elevations typically range is from 8,600 to 9,800 ft (2,630 to 2,990 m). Stands occur on mid to lower slopes on northerly aspects, and occasionally in lower slope canyon bottoms and coves of southerly aspects. The understory is dominated by herbs and can be diverse and luxuriant in cover. With the exception of Gambel oak and Rocky Mountain maple, shrubs and subshrubs are typically poorly represented. Grassy understories occasionally occur adjacent to lower montane grasslands		



Figure 8. White Fir- Douglas-fir/Bigtooth Maple Forest along Redondo Border and upper Deer Canyon at about 9,550 ft (plot: 01VC018; photo: Y. Chauvin).

Blue Spruce Fringe Forest		7
Ha: 313	Acres: 774	
Primary Components: Blue Spruce/Dryspike Sedge Forest Blue Spruce/Sprucefir Fleabane		
Secondary Components: Blue Spruce/Common Juniper		
Inclusions: White Fir/Sprucefir Fleabane Forest White Fir- Douglas-fir/Fendler's meadow-rue Ponderosa Pine/Parry's Danthonia		
Summary: Elevations range is from 8,400 to 9,000 ft (2,550 to 2,750 m). Nearly pure blue spruce stands that occur as narrow belts (fringes) on northerly aspects between valle grasslands and mixed conifer forests of the mountain slopes. The understory is dominated by herbs and can be diverse and luxuriant in cover. With the exception of common juniper, shrubs and subshrubs are poorly represented. Grassy understories with similar compositions to adjacent valle grasslands can also occur.		



Figure 9. Blue Spruce Fringe Forest along Sulphur Creek on the west side of the preserve (photo: E. Muldavin).

Rocky Mountain Ponderosa Pine Forest and Woodland

Conifer forests dominated by ponderosa pine (*Pinus ponderosa*) occupy the lower elevations of the forest zone between valle grasslands and mixed conifer forests. Other conifers can be present but clearly subordinate in the canopy (< 25% of the tree canopy).

<i>Ponderosa Pine Forest and Woodland</i>		13
Ha: 3,739	Acres: 9,241	
Primary Components: Ponderosa Pine/Arizona Fescue Ponderosa Pine-Gambel Oak		
Secondary Components: Ponderosa Pine/Parry's Danthonia Ponderosa Pine/Common Juniper		
Inclusions: Ponderosa Pine/Sun Sedge Pinyon Pine-Gambel Oak		
Summary: Elevations typically range from 8,100 to 9,300 ft (2,450 to 2,840 m). On southerly aspects stands extend out into valle grasslands or high montane grasslands as “woodland savanna.” In contrast, at upper elevations and on northerly slopes stands are commonly successional to mixed conifer forest. Understories range from shrub to grass dominated. Small inclusions of pinyon pine woodland occur on southerly slopes on the west side of the preserve.		



Figure 10. Ponderosa Pine/Arizona Fescue Forest located along the lower slope of the Valle San Antonio rim (plot: 01VC032; photo: E. Muldavin).

Shrublands

Vegetation dominated by shrubs up to 5 m tall.

Rocky Mountain Montane Shrubland

Shrublands dominated by Gambel oak (*Quercus gambelii*) and New Mexico locust (*Robinia neomexicana*) that are less than 5 m tall. Trees are usually scattered and occupy less than 10% cover. Stands are typically considered successional to lower-elevation ponderosa and mixed conifer fir forests following fire, but clonal Gambel oak shrublands can be long-lived and occupy a site for long periods, particularly with repeated burning.

<i>Gambel Oak-Mixed Montane Shrubland</i>		14
Ha: 584	Acres: 1,443	
Primary Components: Gambel Oak-New Mexico Locust/Meadow-rue Gambel Oak/Kentucky Bluegrass		
Secondary Components: Gambel Oak/Rockspirea Gambel Oak/Sun Sedge		
Inclusions: Rock Outcrop White Fir-Douglas-Fir/Gambel Oak		
Summary: Elevations typically range from 8,300 to 9,400 ft (2,540 to 2,870 m). Shrublands dominated by Gambel oak and New Mexico locust that typically occur on southerly aspects of mid to lower mountain slopes and in canyons, often on rocky sites. Understories range from shrub to grass dominated.		

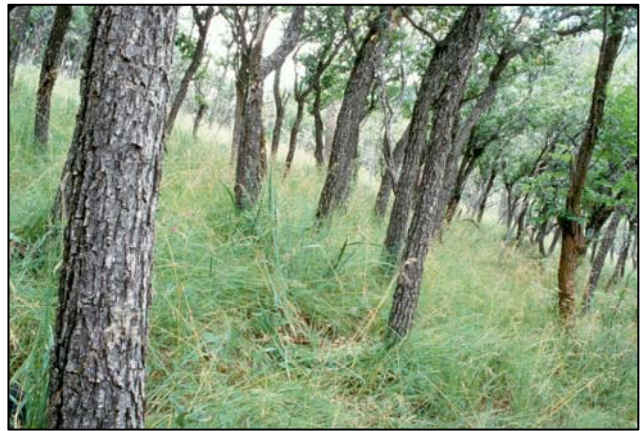


Figure 11. Gambel Oak/Kentucky Bluegrass Woodland in Alamo Canyon at about 8,760 ft (plot: 01VC026; photo: Y. Chauvin).

Rocky Mountain Montane Riparian Shrubland

Riparian shrublands dominated by thinleaf alder (*Alnus tenuifolia*) that occur along perennial mountain streams. Blue spruce may also be a significant component forming open riparian woodland. Other conifers are typically absent or minor.

Montane Riparian Shrublands		21
Ha: 6	Acres: 14	
Primary Components: Blue Spruce/Thinleaf Alder/Fendler Waterleaf		
Secondary Components: Bog Birch/Water Sedge/Stiff Clubmoss		
Inclusions: Northwest Territory Sedge-Smallwing Sedge Woolly Sedge-Common Spikerush		
Summary: Broadleaf riparian shrublands that occur along perennial mountain streams and fen (bogs) margins. Elevations typically range from 8,300 to 9,400 ft (2,540 to 2,870 m). Streamside communities that are dominated by thinleaf alder and occasional blue spruces. Understories are forb-rich and luxuriant, and typically have numerous obligate wetland species. The fen complex in Alamo Canyon supports a unique bog birch community that is part of this unit.		



Figure 12. Thinleaf Alder/Fendler Waterleaf Montane Riparian Shrubland along La Jara Creek at about 9,420 ft (plot: 01VC010; photo: Y. Chauvin).

Herbaceous Vegetation

Vegetation dominated by graminoids and forbs; trees or shrubs have less than 10% canopy cover.

Rocky Mountain Montane Grasslands

Grasslands dominated by upland bunch grasses. Scattered conifers and aspens can occur on sites that have had low fire incidence or as remnants following fire or logging.

<i>Upper Montane Grasslands</i>		16
Ha: 1,996	Acres: 4,933	
Primary Components: Parry's Danthonia-Arizona Fescue Thurber's fescue-Parry's Danthonia		
Secondary Components: Parry's Danthonia-Idaho Fescue Parry's Danthonia-Kentucky Bluegrass Thurber's fescue- Kentucky Bluegrass		
Inclusions: Arizona Fescue-Mountain Muhly Arizona Fescue-Pine Dropseed Arizona Fescue-Blue Grama		
Summary: Elevations typically range from 8,400 to 10,500 ft (2,560 to 2,870 m). At lower elevations, these grasslands are found along the upper alluvial fan piedmonts of valleys, and occasionally in the valley floor. At the highest elevations they occupy south-facing slopes and ridges.		



Figure 13. Parry's Danthonia-Thurber Fescue Upper Montane Grassland on the Valle Grande east piedmont at about 8,680 ft (plot: 01VC012; photo: Y. Chauvin).

<i>Lower Montane Grasslands</i>		17
Ha: 5,111	Acres: 12,631	
Primary Components: Arizona Fescue-Pine Dropseed Grassland Arizona Fescue -Kentucky Bluegrass		
Secondary Components: Arizona Fescue-Idaho Fescue Grassland Arizona Fescue-Mountain Muhly Pine Dropseed-Mountain Muhly		
Inclusions: Blue Grama- Kentucky Bluegrass Pine Dropseed-Common Yarrow Thurber's Fescue-Parry's Danthonia Thurber's fescue-Kentucky Bluegrass		
Summary: Elevations typically range from 8,400 to 9,000 ft (2,560 to 2,750 m). These grasslands are found along the alluvial fan piedmont slopes extending into the valle bottoms, often below a band of Upper Montane Grasslands (Map Unit 16). They occasionally occur on mountain foot slopes or in isolated mountain valleys. Shrubs such as wooly cinquefoil can be common, but not abundant.		



Figure 14. Arizona Fescue-Mountain Muhly Lower Montane Grassland in the Valle Grande east piedmont at about 8,550 ft (plot: 01VC014; photo: Y. Chauvin).


<i>Forest Meadow</i>		3
Ha: 1,996	Acres: 4,933	
Primary Components: Thurber Fescue-Kentucky Bluegrass Kentucky Bluegrass/Common Dandelion		
Secondary Components: Parry Danthonia-Kentucky Bluegrass Arizona Fescue-Kentucky Bluegrass		
Inclusions: Thurber Fescue-Parry's Danthonia		
Summary: Elevations typically range from 8,900 to 10,500 ft (2,560 to 3,175 m). Grasslands associated with post-burn and post-logging high-elevation forests. Scattered remnant trees are common. Most common on mountaintops and ridgelines.		



Figure 15. Forest Meadow is commonly associated with post-logging clearings such as this one along Redondo Border (photo:E. Muldavin).

Rocky Mountain Wet Meadows and Wetlands

Herbaceous vegetation of valley bottoms and swales dominated by grasses, rushes and sedges, many of which are either facultative or obligate wetland species.

<i>Montane Wet Meadow</i>		19
Ha: 2,360	Acres: 5,832	
Primary Components: Tufted Hairgrass/Woolly Cinquefoil Tufted Hairgrass-Baltic Rush Grassland Baltic Rush-Kentucky Bluegrass Kentucky Bluegrass- Common Dandelion		
Secondary Components: Tufted Hairgrass-Smallwing Sedge Pine Dropseed-Baltic Rush		
Inclusions: Arizona Fescue -Kentucky Bluegrass Northwest Territory Sedge-Smallwing Sedge		
Summary: Elevations typically range from 8,400 to 9,000 ft (2,560 to 2,740 m). Herbaceous vegetation dominated by a combination of facultative wetland and upland species. Stands most commonly occur on valley bottom surfaces that are not part of the active floodplain (terraces and lower alluvial slopes). They can extend up drainage ways and in springy areas of the surrounding valle alluvial piedmont slopes.		
		
		<p>Figure 16. Pine Dropseed-Baltic Rush Wet Meadow in the Valle Toledo at 8,600 ft (plot: 01VC006; photo:P. Tonne).</p>

<i>Montane Wetland</i>		20
Ha: 413	Acres: 1,021	
Primary Components: Northwest Territory Sedge-Smallwing Sedge Woolly Sedge-Common Spikerush		
Secondary Components: Northwest Territory Sedge-Longstyle Rush Water Sedge-Northwest Territory Sedge Tufted Hairgrass-Northwest Territory Sedge Kentucky Bluegrass- Common Dandelion		
Inclusions: Tufted Hairgrass/Woolly Cinquefoil Baltic Rush-Kentucky Bluegrass Baltic Rush-Tufted Hairgrass Grassland Narrowleaf Burreed Herbaceous Alliance		
Summary: Elevations typically range from 8,100 to 8,700 ft (2,450 to 2,640 m). Herbaceous vegetation dominated by obligate and facultative wetland species. Stands occur along valley bottom drainage ways that are part of the active floodplain. They can extend up drainage ways and into springy areas of the surrounding valle terraces alluvial piedmont slopes. The unit also includes small inclusions of aquatic vegetation (narrowleaf burreed plant association).		



Figure 17. Northwest Territory Sedge-Smallwing Sedge Wetland in the Valle Toledo at 8,610 ft (plot: 01VC033; photo: P. Tonne).

Miscellaneous Map Units

<i>Rock Outcrop</i>		24
Ha: 64 Acres: 159		
Primary Components: Sparsely Vegetated Rock Outcrop		
Secondary Components:		
Inclusions: Felsenmeer Rock Field Roads-Disturbed Ground		
Summary: Volcanic rock outcrops commonly composed of rhyolite or andesite are scattered on the slopes of the domes and the caldera rim		



Figure 18. Rock Outcrop along the Valle San Antonio rim at about 9,000 ft (plot: 01VC070; photo: E.. Muldavin)

<i>Felsenmeer Rock Field</i>		25
Ha: 370 Acres: 915		
Primary Components: Felsenmeer		
Secondary Components:		
Inclusions: Sparsely Vegetated Rock Outcrop Roads-Disturbed Ground		
Summary: talus slopes composed volcanic cobbles and boulders that are typically un-vegetated		



Figure 19. Felsenmeer on Redondito forming essentially non-vegetated talus slopes (photo: E. Muldavin).

DISCUSSION

We consider the vegetation map of the Valles Caldera National Preserve presented here to be the most accurate and highest resolution map produced to date. While a formal, quantitative accuracy assessment was not generated at this time, several informal field validation trips were conducted to insure that the general patterns of vegetation distribution matched well with the map at the target user scale of 1:24,000 and the specified minimum map unit delineation size of 0.5 ha (keeping in mind the national USGS/NPS standard of 80% accuracy). Accordingly, although the map as delivered in its digital format is at a minimum map unit size of 36 m², we caution against ascribing high confidence to the patches smaller than the 0.5 ha of original target minimum map unit size (USGS/NPS specifications). For uses at the finer resolution, we recommend follow-on site-level mapping at 1:6,000 scale.

Overall, the map should serve general natural resources management uses well in the realms of grazing, forestry, wetlands protection, and wildlife and biodiversity conservation. Furthermore, since the map is available in a digital form within a GIS, timely updates can be performed as new information becomes available, either at the local site level or across the preserve as a whole, making the map a living document serving the adaptive management needs of the preserve.

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- Muldavin. E. and P. Tonne. 2003. A Vegetation Survey and Preliminary Ecological Assessment of Valles Caldera National Preserve, New Mexico. Natural Heritage New Mexico final report to Valles Caldera National Preserve, New Mexico. 73p + App.
- NatureServe. 2005. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. U.S.A. Data current as of 19 October 2005.
- USDA, NRCS. 2006. The PLANTS Database, 6 March 2006 (<http://plants.usda.gov>). Data compiled from various sources by Mark W. Skinner. [National Plant Data Center](#), Baton Rouge, LA 70874-4490 USA.

APPENDIX A.

List of Vegetation Plots

List of all plots collected for the development of the Valles Caldera National Preserve Vegetation Map. “PlotID” refers to plot number in the VCNP vegetation map database. “Plant Association” is the plant community type according to the NHNM state vegetation classification. “Survey site” is the informal general location of the plot. UTM Easting and northing coordinates are given in the NAD 27 datum. In addition, an ArcGIS shapefile was produced that matches the tables, which can be found on the accompanying Data Addendum CD.

PlotID	Plant Association	Survey site	Northing	Easting
01VC001	<i>Abies concolor</i> / <i>Vaccinium myrtillus</i> Forest	South Mountain	3968586	363694
01VC002	<i>Festuca arizonica</i> - <i>Bouteloua gracilis</i> Grassland	Headquarters Valle	3969042	363942
01VC003	<i>Blepharoneuron tricholepis</i> - <i>Juncus balticus</i> Grassland	East Fork Jemez - Bottoms	3968141	365284
01VC004	<i>Juncus balticus</i> - <i>Poa pratensis</i> Grassland	HQ Valle	3968220	365340
01VC005	<i>Danthonia parryi</i> - <i>Poa pratensis</i> / <i>Potentilla hippiana</i> Grassland	E. slope of Valle Grande	3966903	365923
01VC006	<i>Pseudotsuga menziesii</i> / <i>Acer glabrum</i> Forest	Headquarters Forest - La Jara Creek	3970834	362010
01VC007	<i>Abies concolor</i> - <i>Populus tremuloides</i> / <i>Festuca thurberi</i> Forest	Headquarters Forest - La Jara Creek	3970853	362259
01VC008	<i>Picea pungens</i> / <i>Fragaria vesca</i> Forest	Pajarito Rim	3969326	370668
01VC009	<i>Pseudotsuga menziesii</i> / <i>Vaccinium myrtillus</i> Forest	La Jara Creek	3970851	361840
01VC010	<i>Picea pungens</i> / <i>Alnus incana</i> ssp. <i>tenuifolia</i> / <i>Hydrophyllum fendleri</i> Forest	La Jara Creek	3970928	361822
01VC011	<i>Abies concolor</i> - <i>Populus tremuloides</i> / <i>Acer glabrum</i> Forest	Cerro Grande	3969231	370912
01VC012	<i>Festuca thurberi</i> - <i>Danthonia parryi</i> Grassland	Valle Grande east piedmont	3969382	370780
01VC013	<i>Pseudotsuga menziesii</i> / <i>Jamesia americana</i> Forest	Pajarito Rim	3972428	372337
01VC014	<i>Pseudotsuga menziesii</i> / <i>Thalictrum fendleri</i> Forest	Pajarito Rim	3972449	372466
01VC015	<i>Populus tremuloides</i> / <i>Thalictrum fendleri</i> Forest	Pajarito Rim	3972546	372236
01VC016	<i>Pinus ponderosa</i> / <i>Danthonia parryi</i> Forest	Pajarito Rim	3972500	372132
01VC017	<i>Pinus ponderosa</i> / <i>Festuca arizonica</i> Forest	Cajete	3966619	357547
01VC018	<i>Carex utriculata</i> - <i>Carex simulata</i> Grassland	Banco Bonito	3969134	354993
01VC019	<i>Pinus ponderosa</i> / <i>Carex inops</i> ssp. <i>heliophila</i> Forest	Pajarito Rim	3971609	372204
01VC020	<i>Carex utriculata</i> - <i>Carex simulata</i> Grassland	Upper Grande	3969681	369673
01VC021	<i>Picea pungens</i> / <i>Fragaria vesca</i> Forest	Lower Valle Toledo	3978244	368052
01VC022	<i>Pseudotsuga menziesii</i> / <i>Mahonia repens</i> Forest	Upper Valle Toledo - East	3976718	372059
01VC023	<i>Picea engelmannii</i> / <i>Danthonia parryi</i> Forest	San Antonio Rim	3985000	364800
01VC024	<i>Danthonia parryi</i> - <i>Festuca arizonica</i> Grassland	Valle Toledo-West	3980751	366083
01VC025	<i>Carex utriculata</i> - <i>Carex simulata</i> Grassland	Valle Toledo	3980854	365964
01VC026	<i>Danthonia parryi</i> - <i>Festuca arizonica</i> Grassland	San Antonio Rim-Garita	3984716	365256
01VC027	<i>Picea engelmannii</i> / <i>Carex siccata</i> Forest	San Antonio Rim	3984831	365228
01VC028	<i>Festuca thurberi</i> - <i>Danthonia parryi</i> Grassland	San Antonio Rim-Garita	3984671	364848
01VC029	<i>Picea engelmannii</i> / <i>Erigeron eximius</i> Forest	Indio	3985222	368196
01VC030	<i>Blepharoneuron tricholepis</i> - <i>Juncus balticus</i> Grassland	Toledo	3980290	366811
01VC031	<i>Juncus balticus</i> - <i>Poa pratensis</i> Grassland	Valle San Antonio	3981902	362384
01VC032	<i>Picea pungens</i> / <i>Carex siccata</i> Forest	Valle San Antonio	3981048	365169
01VC033	<i>Carex utriculata</i> - <i>Carex microptera</i> Grassland	Toledo	3980044	366761
01VC034	<i>Bouteloua gracilis</i> - <i>Poa pratensis</i> Grassland	Valle San Antonio	3981955	361889
01VC035	<i>Betula glandulosa</i> / <i>Carex aquatilis</i> / <i>Lycopodium annotinum</i> Shrubland	Alamo Bog	3975429	356875
01VC036	<i>Deschampsia cespitosa</i> - <i>Carex aquatilis</i> Grassland	Alamo Bog	3975378	356801
01VC037	<i>Quercus gambelii</i> / <i>Robinia neomexicana</i> / <i>Carex inops</i> ssp. <i>heliophila</i> Shrubland	Alamo Canyon	3975620	357716
01VC038	<i>Populus tremuloides</i> / <i>Erigeron eximius</i> Forest	Alamo Canyon	3975400	357901

Appedix A -- VCNP Vegetation Plot List

PlotID	Plant Association	Survey site	Northing	Easting
01VC039	Pseudotsuga menziesii/Mahonia repens Forest	San Antonio Rim	3985151	357153
01VC040	Pseudotsuga menziesii/Juniperus communis Forest	South Mountain	3967053	363055
01VC041	Abies concolor/Mahonia repens Forest	San Antonio Rim	3985054	356990
01VC042	Pinus ponderosa/Danthonia parryi Forest	Redondo Canyon	3970841	356555
01VC043	Pseudotsuga menziesii/Mahonia repens Forest	Upper Freeloze/Redondo Border	3972899	355328
01VC044	Quercus gambelii/Prunus virginiana Shrubland	Redondo Canyon	3971072	356515
01VC045	Populus tremuloides/Poa pratensis Forest	Mormon Canyon VCNP	3972689	355816
01VC046	Pinus ponderosa/Danthonia parryi Forest	San Antonio Rim	3982925	358244
01VC047	Pseudotsuga menziesii/Acer glabrum Forest	Pajarito Rim	3975684	373696
01VC048	Pinus ponderosa/Festuca arizonica Forest	San Antonio Rim	3982888	358261
01VC049	Festuca thurberi-Danthonia parryi Grassland	Pajarito Rim-Canada Bonita	3975498	373641
01VC050	Danthonia parryi-Festuca arizonica Grassland	Valle San Antonio-west	3983162	355863
01VC051	Pseudotsuga menziesii/Carex rossii Forest	Pajarito Rim (Valle de los Posos)	3975470	373568
01VC052	Festuca arizonica-Muhlenbergia montana Grassland	Valle San Antonio	3981837	359109
01VC053	Carex aquatilis-Carex simulata Grassland	HQ Valle	3969294	363203
01VC054	Abies concolor/Jamesia americana Forest	San Antonio Rim	3984022	360643
01VC055	Abies lasiocarpa/Vaccinium myrtillus Forest	San Antonio Rim	3984976	363417
01VC056	Abies concolor/Mahonia repens Forest	Deer Canyon	3972563	356456
01VC057	Abies concolor-Acer glabrum Forest	Deer Canyon	3972724	356379
01VC058	Blepharoneuron tricholepis-Muhlenbergia montana Grassland	Deer Canyon	3972767	356241
01VC059	Festuca thurberi-Danthonia parryi Grassland	Alamo Canyon	3975478	358955
01VC060	Festuca thurberi/Unclassified Grassland	Valle Grande	3968107	367658
01VC061	Danthonia parryi-Festuca arizonica Grassland	Valle Grande-east piedmont	3968121	367695
01VC062	Deschampsia cespitosa/Potentilla hippiana Grassland	Valle Grande Piedmont	3968288	367583
01VC063	Blepharoneuron tricholepis/Achillea millefolium Grassland	Valle Grande	3968810	367392
01VC064	Deschampsia cespitosa-Carex microptera Grassland	Valle Grande	3968925	367311
01VC065	Deschampsia cespitosa-Carex utriculata Grassland	Valle Grande	3969655	366741
01VC066	Blepharoneuron tricholepis-Muhlenbergia montana Grassland	Valle Grande	3969682	366330
01VC068	Poa pratensis/Taraxacum officinale Grassland	Valle Grande	3969655	366197
01VC069	Pinus ponderosa/Danthonia parryi Forest	San Antonio Rim	3983020	362613
01VC070	Quercus gambelii/Holodiscus dumosus Shrubland	San Antonio Rim	3983356	362341
01VC071	Populus tremuloides/Festuca thurberi Forest	San Antonio Rim	3983994	362086
01VC072	Abies concolor-Acer glabrum Forest	San Antonio Rim	3983777	362063
01VC073	Pinus ponderosa/Juniperus communis/Carex inops ssp. heliophila Forest	HQ Forest	3970182	362712
01VC074	Eleocharis palustris-Carex pellita Grassland	HQ Valle	3969286	365773
01VC075	Pinus edulis-Quercus gambelii Woodland	Freelove Canyon	3973694	354213
01VC076	Quercus gambelii/Carex inops ssp. heliophila Shrubland	Freelove Canyon	3973697	354253
01VC077	Deschampsia cespitosa-Carex utriculata Grassland	Valle San Antonio	3981073	361800
01VC078	Carex utriculata-Carex simulata Grassland	Valle San Antonio	3981088	361993
01VC079	Sparganium angustifolium/Glyceria borealis/Potamogeton nodosus Herbaceous	Valle Seco	3977685	357768
01VC080	Glyceria borealis/Monotypic Stand Grassland	Valle Seco	3977666	357785
01VC081	Eleocharis palustris Grassland Alliance	Valle Seco	3977614	357794
01VC082	Danthonia parryi-Festuca arizonica Grassland	Valle Seco Tank	3977505	358147
01VC083	Juncus balticus-Poa pratensis Grassland	HQ Valle	3969759	363556
01VC084	Festuca arizonica-Blepharoneuron tricholepis Grassland	Valle Toledo	3979068	368028
01VC085	Deschampsia cespitosa-Carex microptera Grassland	Lower Toledo	3979586	368102
01VC086	Deschampsia cespitosa-Carex microptera Grassland	Lower Toledo	3979852	367788
01VC087	Deschampsia cespitosa-Carex utriculata Grassland	Lower Toledo	3979785	367435
01VC088	Pseudotsuga menziesii/Jamesia americana Forest	Upper Valle Grande - West Slope	3973445	370257
01VC089	Pinus flexilis/Juniperus communis Forest	Upper Valle Grande - West Slope	3973287	370187
01VC090	Festuca arizonica-Blepharoneuron tricholepis Grassland	Upper Valle Grande	3972711	370571
01VC091	Festuca arizonica-Bouteloua gracilis Grassland	Valle Grande	3970749	369456

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PlotID	Plant Association	Survey site	Northing	Easting
01VC092	Blepharoneuron tricholepis/Achillea millefolium Grassland	Upper Valle Grande	3971801	370692
01VC093	Picea engelmannii/Erigeron eximius Forest	Valle de los Posos	3976141	373578
01VC094	Danthonia parryi-Festuca arizonica Grassland	Valle de los Posos south piedmont	3976207	372790
01VC095	Carex utriculata/Monotypic Grassland	Valle San Antonio	3981683	362981
01VC096	Juncus balticus-Agrostis gigantea Grassland	Valle San Antonio	3981683	362981
01VC097	Festuca arizonica-Blepharoneuron tricholepis Grassland	Valle San Antonio	3981667	362993
01VC098	Danthonia parryi-Festuca arizonica Grassland	Valle San Antonio terrace	3981612	363000
01VC099	Festuca arizonica-Bouteloua gracilis Grassland	Uper Jaramillo	3975166	365794
01VC100	Abies concolor/Erigeron eximius Forest	Upper Jaramillo	3974981	366166
02AB001	Abies concolor/Mahonia repens Forest	Rabbit Mountain	3967316	368175
02AB002	Abies concolor-Populus tremuloides/Bromus ciliatus Forest	Rabbit Mountain	3967225	367936
02AB003	Pseudotsuga menziesii/Bromus ciliatus Forest	Cerro Grande	3968590	370558
02AB004	Poa pratensis/Taraxacum officinale Grassland	Rabbit Mountain	3968060	369465
02AB005	Picea engelmannii-Acer glabrum Forest	Rabbit Mountain	3967919	369475
02AB006	Picea pungens/Bromus ciliatus Forest	Rabbit Mountain	3967986	369310
02AB007	Pseudotsuga menziesii/Acer glabrum Forest	Rabbit Mountain	3967829	369068
02AB008	Picea engelmannii/Erigeron eximius Forest	Cerro del Medio	3974805	370397
02AB009	Abies lasiocarpa/Festuca thurberi Forest	Cerro del Medio	3974706	370532
02AB010	Populus tremuloides-Acer glabrum Forest	Cerro del Medio	3974939	370465
02AB011	Abies lasiocarpa-Populus tremuloides/Erigeron eximius Forest	Cerro del Medio	3974943	370341
02AB012	Picea engelmannii/Erigeron eximius Forest	Cerro del Medio	3974936	370079
02AB013	Picea engelmannii/Vaccinium myrtillus Forest	Cerro del Medio	3975474	369932
02AB014	Populus tremuloides/Thalictrum fendleri Forest	E of San Antonio Mountain	3980533	358021
02AB015	Pseudotsuga menziesii/Juniperus communis Forest	E of San Antonio Mountain	3980463	357783
02AB016	Picea pungens/Bromus ciliatus Forest	E. of San Antonio Mountain	3980032	357367
02AB017	Pseudotsuga menziesii/Bromus ciliatus Forest	E. of San Antonio Mountain	3980033	357264
02AB018	Populus tremuloides/Thalictrum fendleri Forest	E. of San Antonio Mountain	3979791	357044
02AB019	Abies concolor/Thalictrum fendleri Forest	E. of San Antonio Mountain	3979429	356820
02AB020	Abies concolor/Mahonia repens Forest	San Antonio Mountain	3977487	354369
02AB021	Abies concolor/Mahonia repens Forest	San Antonio Mountain	3977500	354633
02AB022	Abies concolor/Mahonia repens Forest	San Antonio Mountain	3977915	354505
02AB023	Populus tremuloides/Carex siccata Forest	San Antonio Mountain	3977918	354672
02AB024	Populus tremuloides/Carex siccata Forest	San Antonio Mountain	3977977	354599
02AB025	Picea engelmannii/Moss Forest	San Antonio Mountain	3978023	354701
02AB026	Festuca thurberi-Poa pratensis Grassland	San Antonio Mountain	3977909	354743
02AB027	Quercus gambelii/Prunus virginiana Shrubland	Upper Jaramillo	3974568	360231
02AB028	Abies concolor/Quercus gambelii/Festuca thurberi Forest	Upper Jaramillo	3974728	360476
02AB029	Pinus ponderosa/Muhlenbergia montana Forest	Upper Jaramillo	3974536	360496
02AB030	Pinus ponderosa-Quercus gambelii Forest	Upper Jaramillo	3974262	360322
02AB031	Populus tremuloides-Acer glabrum Forest	Upper Jaramillo	3974063	359998
02AB032	Abies concolor/Festuca arizonica-Danthonia parryi Forest	Cerro del Abrigo	3975869	365590
02AB033	Pinus ponderosa/Carex inops ssp. heliophila Forest	Cerro del Abrigo	3975955	365242
02AB034	Pinus ponderosa/Poa pratensis Forest	Cerro del Abrigo	3975658	365454
02AB035	Pseudotsuga menziesii/Acer glabrum Forest	Cerros del Abrigo	3976900	365867
02AB036	Abies concolor/Mahonia repens Forest	Cerros del Abrigo	3976819	365831
02AB037	Pinus ponderosa/Festuca thurberi Forest	Cerros del Abrigo	3977180	365602
02AB038	Pseudotsuga menziesii/Carex rossii Forest	Cerros del Abrigo	3976269	366242
02AB039	Abies concolor/Bromus ciliatus Forest	Cerros del Abrigo	3976326	366044
02AB040	Pinus ponderosa-Populus tremuloides/Festuca thurberi parryi Forest	Cerros del Abrigo	3976294	365790
02AB041	Pinus ponderosa-Populus tremuloides/Festuca thurberi parryi Forest	Cerros del Abrigo	3976026	365371
02AB042	Abies concolor/Poa pratensis Forest	Alamo Canyon	3975428	356585
02AB043	Abies concolor/Erigeron eximius Forest	Alamo Canyon	3975561	356630

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PlotID	Plant Association	Survey site	Northing	Easting
02AB044	Pseudotsuga menziesii-Quercus gambelii/Festuca arizonica Forest	Alamo Canyon	3975804	356615
02AB045	Picea pungens/Danthonia parryi Forest	Alamo Canyon	3975619	356292
02AB046	Picea pungens/Fragaria vesca Forest	Alamo Canyon	3975574	356127
02AB047	Carex utriculata/Monotypic Grassland	Alamo Canyon	3975708	356256
02AB048	Pinus ponderosa/Danthonia parryi Forest	Alamo Canyon	3975930	356262
02AB049	Danthonia parryi-Festuca arizonica Grassland	Alamo Canyon	3975889	356134
02AB050	Pseudotsuga menziesii/Acer glabrum Forest	Banco Bonito East	3968246	357073
02AB051	Abies concolor/Carex rossii Forest	Banco Bonito East	3967921	356914
02AB052	Populus tremuloides/Carex rossii Forest	Banco Bonito East	3967814	357054
02AB053	Abies concolor/Carex rossii Forest	Banco Bonito East	3968041	357094
02AB054	Abies concolor/Mahonia repens Forest	Banco Bonito East	3968037	357247
02AB055	Abies concolor/Carex rossii Forest	Banco Bonito East	3967917	357625
02AB056	Pinus ponderosa/Unclassified Forest	Banco Bonito East	3968092	357830
02AB057	Abies concolor-Populus tremuloides/Thalictrum fendleri Forest	Banco Bonito East	3968175	357765
02AB058	Pinus ponderosa/Unclassified Forest	Banco Bonito W	3968684	354300
02AB059	Pinus ponderosa/Festuca arizonica Forest	Banco Bonito W	3968467	354314
02AB060	Pinus ponderosa/Carex inops ssp. heliophila Forest	Banco Bonito W	3968363	353879
02AB061	Populus tremuloides/Festuca arizonica Forest	Banco Bonito W	3968131	353932
02AB062	Picea pungens/Danthonia parryi Forest	Lower Santa Rosa	3979429	363154
02AB063	Picea pungens/Juniperus communis Forest	Lower Santa Rosa	3979423	363229
02AB064	Abies concolor/Juniperus communis Forest	Lower Santa Rosa	3979397	363383
02AB065	Pseudotsuga menziesii/Mahonia repens Forest	Lower Santa Rosa	3979011	363221
02AB066	Pinus ponderosa/Danthonia parryi Forest	Lower Santa Rosa	3979013	363016
02AB067	Pinus ponderosa/Festuca arizonica Forest	Banco Bonito W	3967013	354275
02AB068	Pinus ponderosa/Festuca arizonica Forest	Banco Bonito W	3966726	354645
02AB069	Pinus ponderosa/Festuca arizonica Forest	Banco Bonito W	3966679	354828
02AB070	Pinus ponderosa-Quercus gambelii Forest	Banco Bonito W	3966700	354730
02AB071	Pinus ponderosa/Carex inops ssp. heliophila Forest	Banco Bonito W	3966697	355311
02AB072	Abies concolor-Populus tremuloides/Festuca arizonica Forest	Banco Bonito W	3967006	355479
02AB073	Pinus ponderosa/Festuca arizonica Forest	Banco Bonito W	3966476	355698
02AB074	Pinus ponderosa/Carex inops ssp. heliophila Forest	Banco Bonito W	3966569	356126
02AB075	Pinus ponderosa/Festuca arizonica Forest	Banco Bonito W	3966314	356479
02AB076	Picea pungens/Festuca thurberi Forest	Northwest Corner	3984227	354623
02AB077	Pseudotsuga menziesii-Populus tremuloides-Acer glabrum Forest	Northwest Corner	3984093	354742
02AB078	Abies concolor/Jamesia americana Forest	Northwest Corner	3983983	354760
02AB079	Pinus ponderosa/Festuca arizonica Forest	Northwest Corner	3983934	355006
02AB080	Populus tremuloides/Thalictrum fendleri Forest	Northwest Corner	3984015	355075
02AB081	Abies concolor/Bromus ciliatus Forest	Northwest Corner	3983926	355247
02AB082	Abies concolor/Festuca arizonica Forest	Northwest Corner	3984015	355244
02AB083	Populus tremuloides/Thalictrum fendleri Forest	Northwest Corner	3983440	354881
02AB084	Picea engelmannii/Carex siccata Forest	Upper Posos	3976342	373650
02AB085	Pinus flexilis/Juniperus communis Forest	Upper Posos	3976432	373761
02AB086	Populus tremuloides/Festuca thurberi-Danthonia parryi Forest	Upper Posos	3976608	373583
02AB087	Picea pungens/Danthonia parryi Forest	Upper Posos	3976504	373386
02AB088	Picea engelmannii/Erigeron eximius Forest	Upper Posos	3976288	373376
02AB089	Picea pungens/Danthonia parryi Forest	Upper Posos	3976732	372983
02AB090	Deschampsia cespitosa-Carex microptera Grassland	Upper Posos	3976446	372979
02AB091	Deschampsia cespitosa-Carex utriculata Grassland	Upper Posos	3976362	373022
02AB092	Danthonia parryi-Festuca arizonica Grassland	Upper Posos	3976148	372139
02AB093	Danthonia parryi-Festuca arizonica Grassland	Upper Posos	3976030	372429
02AB094	Unclassified/Unclassified	Alamo Canyon East Watershed	3975189	356685
02AB095	Quercus gambelii/Prunus virginiana Shrubland	Alamo Canyon East Watershed	3975287	356551

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PlotID	Plant Association	Survey site	Northing	Easting
02AB096	Abies concolor/Bromus ciliatus Forest	Alamo Canyon East Watershed	3975081	356612
02AB097	Picea pungens/Festuca thurberi Forest	Alamo Canyon East Watershed	3975040	356714
02AB098	Pseudotsuga menziesii/Mahonia repens Forest	Alamo Canyon East Watershed	3974967	356965
02AB099	Populus tremuloides-Acer glabrum Forest	Alamo Canyon East Watershed	3974971	357046
02AB100	Abies concolor-Populus tremuloides/Carex siccata Forest	Alamo Canyon East Watershed	3975182	357033
02AB101	Picea pungens/Danthonia parryi Forest	Alamo Canyon East Watershed	3975382	356938
02EM001	Abies concolor/Bromus ciliatus Forest	Back of Rabbit Mountain	3965736	367477
02EM002	Populus tremuloides/Festuca thurberi Forest		3965884	367433
02EM003	Picea engelmannii/Moss Forest	Rabbit Mountain	3966098	367590
02EM004	Pseudotsuga menziesii/Mahonia repens Forest		3966037	367588
02EM005	Populus tremuloides/Festuca thurberi-Danthonia parryi Forest	Rabbit Peak	3965981	367212
02EM006	Pseudotsuga menziesii/Jamesia americana Forest	Rabbit Peak	3966000	367124
02EM007	Pinus ponderosa/Festuca thurberi Forest	Rabbit Peak South	3965803	367192
02ER001	Carex utriculata-Carex simulata Grassland	Lower Santa Rosa Valle	3980293	362984
02ER002	Festuca arizonica-Bouteloua gracilis Grassland	Lower Santa Rosa Valle	3980515	362984
02ER003	Festuca arizonica-Muhlenbergia montana Grassland	Lower Valle Santa Rosa	3980609	362819
02ER004	Danthonia parryi-Festuca arizonica Grassland	Lower Valle Santa Rosa	3980781	362689
02ER005	Pinus ponderosa/Danthonia parryi Forest		3981482	367962
02ER006	Danthonia parryi-Festuca arizonica Grassland	Valle Toledo	3981397	367925
02ER007	Danthonia parryi-Festuca arizonica Grassland	Valle Toledo	3981087	367884
02ER008	Danthonia parryi-Festuca arizonica Grassland	Valle Toledo	3980942	367747
02ER009	Deschampsia cespitosa-Juncus arcticus var. balticus Grassland	Valle Toledo	3980918	367854
02ER010	Festuca arizonica-Blepharoneuron tricholepis Grassland	Valle Toledo	3980380	367661
02ER011	Festuca arizonica-Blepharoneuron tricholepis Grassland	Valle Toledo	3980291	367628
02ER012	Abies lasiocarpa/Carex siccata Forest	Redondo Lower South Side	3969958	360223
02ER013	Abies lasiocarpa/Erigeron eximius Forest	Lower S Redondo	3970028	360081
02ER014	Festuca thurberi-Danthonia parryi Grassland	South Redondo	3969906	360412
02ER015	Pseudotsuga menziesii-Populus tremuloides/Bromus ciliatus Forest	Lower East Redondo Peak	3969988	361292
02ER016	Pseudotsuga menziesii/Thalictrum fendleri Forest	Lower East Side Redondo	3970351	361250
02JS001	Picea pungens/Fragaria vesca Forest	Rabbit Mountain	3967227	367198
02JS002	Picea pungens/Fragaria vesca Forest	Valle Grande (foothills to NW)	3971347	363279
02JS003	Pinus flexilis/Juniperus communis Forest	Valle Grande	3972391	367771
02JS004	Populus tremuloides/Poa pratensis Forest	Valle Grande	3972269	367965
02JS005	Pinus flexilis/Juniperus communis Forest	Valle Grande	3972257	368081
02JS006	Pinus ponderosa/Juniperus communis Forest	Valle Grande	3972146	368168
02JS007	Pinus ponderosa/Juniperus communis Forest	Cerro del Abrigo	3975849	367765
02JS008	Picea pungens/Bromus ciliatus Forest	Cerros del Abrigo	3976105	367925
02JS009	Picea pungens/Fragaria vesca Forest	Cerros del Abrigo	3976028	367770
02JS010	Pinus ponderosa/Unclassified Forest	Cerros del Abrigo	3976206	367700
02JS011	Populus tremuloides/Muhlenbergia montana Forest	Cerros del Abrigo	3976358	367316
02JS012	Pseudotsuga menziesii/Thalictrum fendleri Forest	Cerros del Abrigo	3976482	367420
02JS013	Pinus ponderosa/Danthonia parryi Forest	Cerros del Abrigo	3976461	367798
02JS014	Pseudotsuga menziesii-Quercus gambelii Forest	Cerro Seco	3978226	356952
02JS015	Quercus gambelii/Carex inops ssp. heliophila Shrubland	Cerro Seco	3978128	357250
02JS016	Pinus ponderosa/Festuca arizonica Forest	Cerro Seco	3978074	357295
02JS017	Abies concolor/Carex rossii Forest	Cerro Seco	3978747	356648
02JS018	Festuca thurberi Grassland Alliance	Cerro Seco	3980001	356557
02JS019	Abies concolor-Quercus gambelii Forest	San Antonio Mountain	3978022	355814
02JS020	Abies concolor/Juniperus communis Forest	San Antonio Mountain	3978162	355851
02JS021	Picea engelmannii/Vaccinium myrtillus Forest	San Antonio Mountain	3978308	355802
02JS022	Abies concolor/Juniperus communis Forest	San Antonio Mountain	3978424	355710
02JS023	Pseudotsuga menziesii/Vaccinium myrtillus Forest	San Antonio Mountain	3978574	355781

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PlotID	Plant Association	Survey site	Northing	Easting
02JS024	Pseudotsuga menziesii-Populus tremuloides-Acer glabrum Forest	San Antonio Mountain	3978709	355730
02JS025	Abies concolor/Thalictrum fendleri Forest	San Antonio Mountain	3978424	356028
02JS026	Abies concolor/Poa pratensis Forest	Redondo Border	3974629	357688
02JS027	Populus tremuloides/Vaccinium myrtillus Forest	Redondo Border	3974619	357482
02JS028	Populus tremuloides/Vaccinium myrtillus Forest	Redondo Border	3974562	357382
02JS029	Muhlenbergia montana-Koeleria macrantha Grassland	Redondo Border	3974449	357212
02JS030	Abies concolor/Mahonia repens Forest	Redondo Border	3974311	356776
02JS031	Pseudotsuga menziesii/Juniperus communis Forest	Redondo Border	3974611	357094
02JS032	Abies concolor/Mahonia repens Forest	Redondo Border	3974657	357229
02JS033	Pseudotsuga menziesii/Vaccinium myrtillus Forest	Redondo Border	3974763	357405
02JS034	Pseudotsuga menziesii-Quercus gambelii Forest	Redondo Creek	3971955	356842
02JS035	Abies concolor/Danthonia parryi Forest	Redondo Creek	3971871	357032
02JS036	Unclassified/Unclassified	Redondo Peak	3972652	357573
02JS037	Robinia neomexicana/Bromus ciliatus Shrubland		3972550	357590
02JS038	Picea pungens/Juniperus communis Forest	Cerros de Traskular	3979900	363910
02JS039	Picea pungens/Juniperus communis Forest	Cerros de Traskular	3979800	363928
02JS040	Picea pungens/Juniperus communis Forest	Cerros de Traskular	3979929	363735
02JS041	Pinus ponderosa/Carex inops ssp. heliophila Forest	Cerros de Traskular	3979845	363599
02JS042	Picea pungens/Festuca arizonica Forest	Cerros de Traskular	3980046	363603
02JS043	Poa pratensis/Taraxacum officinale Grassland	Redondito	3972711	362179
02JS044	Pseudotsuga menziesii/Unclassified Forest	Redondito	3972457	362287
02JS045	Picea engelmannii/Unclassified Forest	Redondito	3972254	362014
02JS046	Deschampsia cespitosa-Carex microptera Grassland	Redondito	3972178	361590
02JS048	Abies lasiocarpa/Erigeron eximius Forest	Redondito	3972558	361608
02JS049	Picea engelmannii/Unclassified Forest	Redondo	3972510	361849
02JS050	Abies lasiocarpa/Carex siccata Forest	Redondito	3972550	361252
02JS051	Abies lasiocarpa-Populus tremuloides/Erigeron eximius Forest	Redondito	3972753	361255
02JS054	Pseudotsuga menziesii/Mahonia repens Forest	Garita Road	3984389	364235
02JS055	Pinus ponderosa/Carex inops ssp. heliophila Forest	Garita Road	3983971	364217
02JS056	Pinus ponderosa/Danthonia parryi Forest	Garita Road	3983396	364171
02JS057	Populus tremuloides/Festuca thurberi-Danthonia parryi Forest	Garita Road	3983543	364372
02JS058	Abies concolor/Mahonia repens Forest	Garita Road	3983840	364834
02JS059	Pinus ponderosa/Danthonia parryi Forest	Garita Road	3983628	364623
02JS060	Poa pratensis/Taraxacum officinale Grassland	Upper Redondo	3972898	358216
02JS061	Abies concolor/Unclassified Forest	Upper Redondo Creek	3972790	358141
02JS062	Abies concolor/Thalictrum fendleri Forest	Upper Redondo Creek	3972580	358094
02JS063	Populus tremuloides/Bromus ciliatus Forest	Upper Redondo Creek	3972541	357966
02KW001	Pinus ponderosa-Quercus gambelii Forest		3968346	357025
02KW002	Picea pungens/Fragaria vesca Forest	Cerro del Medio	3974853	367892
02KW003	Abies concolor/Festuca arizonica Forest	Cerro del Medio	3974829	368173
02KW004	Pseudotsuga menziesii/Juniperus communis Forest	Cerro del Medio	3975251	367997
02KW005	Picea pungens/Fragaria vesca Forest	Cerro del Medio	3975008	367808
02KW006	Populus tremuloides/Erigeron eximius Forest	San Antonio Mountain	3978292	355233
02KW007	Abies lasiocarpa/Erigeron eximius Forest	Redondo Peak	3970984	359694
02KW008	Abies concolor-Quercus gambelii Forest	Bonito Canyon	3968429	357679
02KW009	Pseudotsuga menziesii/Mahonia repens Forest	Bonito Canyon	3968166	357135
02KW010	Pinus ponderosa/Carex inops ssp. heliophila Forest	Valle Bonito (Redondo Creek)	3969865	355736
02KW011	Abies concolor/Quercus gambelii/Carex inops ssp. heliophila Forest	Valle Bonito	3970194	356251
02KW012	Abies concolor/Jamesia americana Forest	Valle Bonito	3970150	356444
02KW013	Abies concolor/Jamesia americana Forest	Redondo Creek (upper)	3973829	357020
02KW014	Abies concolor/Unclassified Forest	Upper Redondo Creek	3973339	356659
02KW015	Pseudotsuga menziesii/Juniperus communis Forest	Upper Redondo Creek	3973451	356892

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PlotID	Plant Association	Survey site	Northing	Easting
02KW016	Pseudotsuga menziesii/Thalictrum fendleri Forest	Upper Redondo Creek	3973660	357116
02KW017	Populus tremuloides/Festuca thurberi Forest	Upper Redondo Creek	3973936	357513
02KW018	Abies concolor-Populus tremuloides/Danthonia parryi Forest	Upper Redondo Creek	3973762	357731
02VC001	Festuca arizonica-Bouteloua gracilis Grassland	Lower Santa Rosa	3981336	362806
02VC002	Pseudotsuga menziesii/Thalictrum fendleri Forest	Redondo Border West	3974343	356680
02VC003	Pseudotsuga menziesii-Populus tremuloides/Bromus ciliatus Forest	Redondo Border West Flank	3973977	356626
02VC004	Poa pratensis/Taraxacum officinale Grassland	Redondo Border West	3973981	356671
02VC005	Abies concolor/Thalictrum fendleri Forest	South Mountain	3968195	362519
02VC006	Pseudotsuga menziesii/Vaccinium myrtillus Forest	South Mountain	3967774	362560
02VC007	Pseudotsuga menziesii/Thalictrum fendleri Forest	Rabbit Mountain	3966722	367416
02VC008	Festuca thurberi-Danthonia parryi Grassland	Valle Grande/South Mountain	3966846	361865
02VC009	Pseudotsuga menziesii/Thalictrum fendleri Forest	Valle Grande/South Mountain	3967244	361605
02VC010	Festuca thurberi-Danthonia parryi Grassland	Valle Grande/Rabbit Mountain	3966086	367468
02VC011	Abies concolor/Bromus ciliatus Forest	South Mountain	3967830	363417
02VC012	Pseudotsuga menziesii/Bromus ciliatus Forest	South Mountain	3967717	363382
02VC013	Populus tremuloides/Festuca arizonica Forest	Cerro Grande	3968486	370814
02VC014	Pseudotsuga menziesii/Thalictrum fendleri Forest	Rabbit Mountain	3966985	367267
02VC016	Abies concolor/Carex siccata Forest	Sherwood Forest	3970835	363803
02VC017	Pseudotsuga menziesii/Thalictrum fendleri Forest	Cerro Grande	3968792	370587
02VC018	Abies concolor-Acer glabrum Forest	Rabbit Mountain	3967017	367928
02VC019	Abies concolor/Thalictrum fendleri Forest	Rabbit Mountain	3967499	368258
02VC020	Picea engelmannii/Moss Forest	Valle Grande/Rabbit Mountain	3966203	367345
02VC021	Picea engelmannii-Acer glabrum Forest	Valle Grande/Rabbit Mountain	3966351	367410
02VC022	Quercus gambelii/Robinia neomexicana/Carex inops ssp. heliophila Shrubland	Redondo	3968443	357022
02VC023	Pinus ponderosa/Danthonia parryi Forest		3968385	361983
02VC024	Picea pungens/Fragaria vesca Forest	Valle Grande	3967822	361894
02VC025	Muhlenbergia montana-Koeleria macrantha Grassland		3977785	355762
02VC026	Abies concolor/Bromus ciliatus Forest	LOGGED	3977670	355905
02VC027	Abies concolor/Bromus ciliatus Forest	Canyons	3977322	355757
02VC028	Abies concolor/Jamesia americana Forest	Canyons	3978066	355206
02VC029	Populus tremuloides/Erigeron eximius Forest		3978237	355102
02VC030	Picea engelmannii/Erigeron eximius Forest	Redondo Peak	3970118	359123
02VC031	Danthonia parryi-Festuca arizonica Grassland	Headquarters Valle Grande	3970273	363256
02VC032	Poa pratensis/Taraxacum officinale Grassland	Headquarters Valle Grande	3970216	363400
02VC033	Pinus ponderosa/Carex inops ssp. heliophila Forest	Valle Bonito	3970184	356050
02VC034	Danthonia parryi-Festuca arizonica Grassland	Headquarters Valle Grande	3970621	364035
02VC035	Festuca arizonica-Muhlenbergia montana Grassland	Headquarters Valle Grande	3970533	364208
02VC036	Unclassified/Unclassified	Headquarters Valle Grande	3970536	363622
02VC037	Abies lasiocarpa/Moss Forest	Pajarito Mountain	3972594	373247
02VC038	Unclassified/Unclassified	Headquarters Valle Grande	3970618	363528
02VC039	Pseudotsuga menziesii/Danthonia parryi Forest	Pajarito Mountain	3972150	373345
02YC001	Festuca arizonica-Bouteloua gracilis Grassland	Valle Santa Rosa	3981190	362643
02YC002	Poa pratensis/Taraxacum officinale Grassland	Valle Santa Rosa	3981041	362712
02YC003	Festuca arizonica-Muhlenbergia montana Grassland	Valle Santa Rosa	3980962	362802
02YC004	Festuca arizonica-Muhlenbergia montana Grassland	Valle Santa Rosa	3980850	362878
02YC005	Festuca arizonica-Muhlenbergia montana Grassland	Valle Toledo	3981629	368113
02YC006	Poa pratensis/Taraxacum officinale Grassland	Valle Toledo	3978795	367353
02YC007	Danthonia parryi-Festuca arizonica Grassland	Valle Toledo	3978908	367525
02YC008	Carex microptera-Carex pellita Grassland	Valle Toledo	3979112	367590
02YC009	Festuca arizonica-Muhlenbergia montana Grassland	Valle Toledo	3979314	367705
02YC010	Danthonia parryi-Festuca arizonica Grassland	Valle Toledo	3979537	367840
02YC011	Festuca arizonica-Muhlenbergia montana Grassland	Valle Toledo	3979518	367594

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PlotID	Plant Association	Survey site	Northing	Easting
02YC012	<i>Picea engelmannii</i> /Moss Forest	Pajarito	3972473	373244
02YC013	<i>Danthonia parryi</i> - <i>Festuca arizonica</i> Grassland	Pajarito Mountain	3972023	373596
02YC014	<i>Festuca arizonica</i> - <i>Poa pratensis</i> Grassland	NE Piedmont Valle Grande	3968388	368926
02YC015	<i>Danthonia parryi</i> - <i>Festuca arizonica</i> Grassland	NE Piedmont of Valle Grande	3968661	368965
02YC016	<i>Danthonia parryi</i> - <i>Poa pratensis</i> Grassland	NE Piedmont Valle Grande	3969028	368878
02YC017	<i>Carex utriculata</i> - <i>Carex simulata</i> Grassland	NE Piedmont of Valle Grande	3969045	368722
02YC018	<i>Deschampsia cespitosa</i> - <i>Poa pratensis</i> Grassland	NE Piedmont of Valle Grande	3969278	368325
02YC019	<i>Juncus balticus</i> - <i>Poa pratensis</i> Grassland	NE Piedmont Valle Grande	3969464	368495
02YC020	<i>Poa pratensis</i> / <i>Taraxacum officinale</i> Grassland	NE Piedmont of Valle Grande	3969385	368598
02YC021	<i>Carex utriculata</i> - <i>Carex simulata</i> Grassland	NE Piedmont of Valle Grande	3969284	368580
02YC022	<i>Juncus balticus</i> - <i>Poa pratensis</i> Grassland	NE Piedmont Valle Grande	3968977	369082
02YC023	<i>Festuca arizonica</i> - <i>Muhlenbergia montana</i> Grassland	Headquarters Piedmont	3969082	364356
02YC024	<i>Carex microptera</i> - <i>Carex pellita</i> Grassland	Headquarters Piedmont	3969204	364414
02YC025	<i>Danthonia parryi</i> - <i>Festuca arizonica</i> Grassland	Headquarters Piedmont Valle Grande	3969248	364447
02YC026	<i>Juncus balticus</i> - <i>Poa pratensis</i> Grassland	Headquarters Piedmont Valle Grande	3969374	364557
02YC027	<i>Blepharoneuron tricholepis</i> - <i>Muhlenbergia montana</i> Grassland	Headquarters Piedmont Valle Grande	3969466	364539
02YC028	<i>Poa pratensis</i> / <i>Taraxacum officinale</i> Grassland	Headquarters Piedmont Valle Grande	3969541	364387
02YC029	<i>Carex simulata</i> - <i>Carex pellita</i> Grassland	Headquarters Piedmont Valle Grande	3969692	363933

APPENDIX B

VCNP Vegetation Map Plant Species List

List of plant species recorded as part of the Valles Caldera National Preserve Vegetation Map field survey from 2001 through 2003. “LF” refers to lifeform strata: 1 = trees, 2 = tall shrubs, (>0.5 m), 2.5 = dwarf shrubs (<0.5 m), 3 = grasses and grass-like plants (graminoids), and 4 = forbs. “Plants symbol” refers to the code form the PLANTS database (USDA-NRCS, 2006). The “NHNM code” is the respective code in the database provided in the Data Addendum CD. “N” refers to the number of occurrences in the database. “O” refers to origin: native (N), Introduced (I), or Unknown (U). “D” refers to duration: P = perennial, A = annual, B = biennial. “WI” refers to wetland indicator status as listed in the PLANTS database

LF	Plants symbol	NHNM code	Scientific name	Common name	Family	N	O	D	WI
1	ABCO	ABICON	<i>Abies concolor</i>	white fir	Pinaceae	319	N	P	NI (FAC)
1	ABLA	ABILAS	<i>Abies lasiocarpa</i>	subalpine fir	Pinaceae	39	N	P	FACU+
1	ACGL	ACEGLA	<i>Acer glabrum</i>	Rocky Mountain maple	Aceraceae	82	N	P	FAC (FACW)
1	JUMO	JUNMON	<i>Juniperus monosperma</i>	oneseed juniper	Cupressaceae	1	N	P	NI (UPL)
1	JUSC2	JUNSCO	<i>Juniperus scopulorum</i>	Rocky Mountain juniper	Cupressaceae	6	N	P	NI (UPL)
1	PIEN	PICENG	<i>Picea engelmannii</i>	Engelmann's spruce	Pinaceae	96	N	P	FAC-
1	PIPU	PICPUN	<i>Picea pungens</i>	blue spruce	Pinaceae	117	N	P	FAC
1	PIED	PINEDU	<i>Pinus edulis</i>	pinyon pine	Pinaceae	4	N	P	NI (UPL)
1	PIFL2	PINFLE	<i>Pinus flexilis</i>	limber pine	Pinaceae	142	N	P	
1	PIPO	PINPON	<i>Pinus ponderosa</i>	ponderosa pine	Pinaceae	146	N	P	NI (FACU)
1	PIST3	PINSTR	<i>Pinus strobiformis</i>	Southwestern white pine	Pinaceae	1	N	P	
1	POTR5	POPTRE	<i>Populus tremuloides</i>	quaking aspen	Salicaceae	240	N	P	FACU (FAC)
1	PRVI	PRUVIR	<i>Prunus virginiana</i>	common chokecherry	Rosaceae	4	N	P	FAC (FACW)
1	PRVIM	PRUVIRM	<i>Prunus virginiana</i> var. <i>melanocarpa</i>	black chokecherry	Rosaceae	4	N	P	FAC (FACW)
1	PSME	PSEMEN	<i>Pseudotsuga menziesii</i>	Douglas-fir	Pinaceae	307	N	P	NI (FAC)
1	QUGA	QUEGAM	<i>Quercus gambelii</i>	Gambel's oak	Fagaceae	88	N	P	NI (UPL)
1	SABE2	SALBEB	<i>Salix bebbiana</i>	Bebb willow	Salicaceae	1	N	P	FACW
1	SASC	SALSCO	<i>Salix scouleriana</i>	Scouler's willow	Salicaceae	2	N	P	

Appedix B -- VCNP Vegetation Map Plant Species List

LF	Plants symbol	NHNM code	Scientific name	Common name	Family	N	O	D	WI
2	AMPU5	AMEPUM	<i>Amelanchier pumila</i>	dwarf serviceberry	Rosaceae	3	N	P	
2	BEFE	BERFEN	<i>Berberis fendleri</i>	Colorado barberry	Berberidaceae	1	N	P	NI
2	BRCA3	BRICAL	<i>Brickellia californica</i>	California brickellbush	Asteraceae	1	N	P	FACU+
2	BRFE	BRIFEN	<i>Brickellia fendleri</i>	Fendler's brickellbush	Asteraceae	2	N	P	
2	BRGR	BRIGRA	<i>Brickellia grandiflora</i>	tasselflower brickellbush	Asteraceae	1	N	P	NI (FACU+)
2	BRICK	BRICKE	<i>Brickellia</i> spp.	brickellbush	Asteraceae	1	N	P	
2	CEFE	CEAFEN	<i>Ceanothus fendleri</i>	Fendler's ceanothus	Rhamnaceae	2	N	P	NI (UPL)
2	CEMO2	CERMON	<i>Cercocarpus montanus</i>	mountain mahogany	Rosaceae	5	N	P	NI (UPL)
2	CLCOC2	CLECOLC	<i>Clematis columbiana</i> var. <i>columbiana</i>	rock clematis	Ranunculaceae	35	N	P	
2	CLEMA	CLEMAT	<i>Clematis</i> spp.	clematis	Ranunculaceae	10	N	U	
2	DAFL3	DASFLO	<i>Dasiphora floribunda</i>	shrubby cinquefoil	Rosaceae	28	N	P	
2	HODU	HOLDUM	<i>Holodiscus dumosus</i>	rockspirea	Rosaceae	13	N	P	NI (UPL)
2	JAAM	JAMAME	<i>Jamesia americana</i>	cliffbush	Hydrangeaceae	32	N	P	FACU
2	JUCO6	JUNCOM	<i>Juniperus communis</i>	common juniper	Cupressaceae	115	N	P	NI (UPL)
2	LOIN5	LONINV	<i>Lonicera involucrata</i>	twinberry honeysuckle	Caprifoliaceae	1	N	P	FACU (FACW)
2	PHMI4	PHIMIC	<i>Philadelphus microphyllus</i>	littleleaf mockorange	Hydrangeaceae	1	N	P	
2	PHMO4	PHYMON	<i>Physocarpus monogynus</i>	mountain ninebark	Rosaceae	6	N	P	FACU
2	RICE	RIBCER	<i>Ribes cereum</i>	wax currant	Grossulariaceae	3	N	P	NI (FAC)
2	RILE	RIBLEP	<i>Ribes leptanthum</i>	trumpet gooseberry	Grossulariaceae	15	N	P	NI (FAC)
2	RIMO2	RIBMON	<i>Ribes montigenum</i>	gooseberry currant	Grossulariaceae	1	N	P	
2	RIBES	RIBES	<i>Ribes</i> spp.	currant; gooseberry	Grossulariaceae	37	N	P	
2	RIWO	RIBWOL	<i>Ribes wolfii</i>	Wolf's currant	Grossulariaceae	2	N	P	FAC
2	RONE	ROBNEO	<i>Robinia neomexicana</i>	New Mexico locust	Fabaceae	49	N	P	NI (FACU)
2	RONUH	ROSNUTH	<i>Rosa nutkana</i> var. <i>hispida</i>	bristly Nootka rose	Rosaceae	1	N	P	
2	ROWO	ROSWOO	<i>Rosa woodsii</i>	Woods' rose	Rosaceae	53	N	P	FACU
2	RUID	RUBIDA	<i>Rubus idaeus</i>	Red Raspberry	Rosaceae	16	N	P	
2	RUPA	RUBPAR	<i>Rubus parviflorus</i>	thimbleberry	Rosaceae	34	N	P	NI (FAC)
2	RUBUS	RUBUS	<i>Rubus</i> spp.	raspberry	Rosaceae	4	N	P	
2	SARA2	SAMRAC	<i>Sambucus racemosa</i>	scarlet elderberry	Caprifoliaceae	1	N	P	FACU (FACW)
2	SAMBU	SAMBUC	<i>Sambucus</i> spp.	elderberry	Caprifoliaceae	3	N	P	
2	SHCA	SHECAN	<i>Shepherdia canadensis</i>	russet buffaloberry	Elaeagnaceae	1	N	P	
2	SYOR2	SYMORE	<i>Symphoricarpos oreophilus</i>	whortleleaf snowberry	Caprifoliaceae	7	N	P	NI (UPL)

Appedix B -- VCNP Vegetation Map Plant Species List

LF	Plants symbol	NHNM code	Scientific name	Common name	Family	N	O	D	WI
2	SYMPH	SYMPHO	Symphoricarpos spp.	snowberry	Caprifoliaceae	4	N	P	
2	YUBA	YUCBAC	Yucca baccata	banana yucca	Agavaceae	1	N	P	NI
2.5	AGHE5	AGEHER	Ageratina herbacea	fragrant snakeroot	Asteraceae	1	N	P	NI
2.5	ARUV	ARCUVA	Arctostaphylos uva-ursi	kinnikinnick	Ericaceae	6	N	P	
2.5	ARFR4	ARTFRI	Artemisia frigida	fringed sagewort	Asteraceae	8	N	P	NI (FACU)
2.5	B EGL	BETGLA	Betula glandulosa	dwarf birch	Betulaceae	1	N	P	
2.5	CALI5	CASLIN2	Castilleja lineata	marshmeadow Indian paintbrush	Scrophulariaceae	1	N	P	
2.5	ECCO5	ECHCOC	Echinocereus coccineus	scarlet hedgehog cactus	Cactaceae	1	N	P	
2.5	ECTR	ECHTRI	Echinocereus triglochidiatus	kingcup cactus	Cactaceae	1	N	P	
2.5	MARE11	MAHREP	Mahonia repens	Oregongrape	Berberidaceae	32	N	P	NI (UPL)
2.5	PAMY	PAXMYR	Paxistima myrsinites	myrtle boxleaf	Celastraceae	107	N	P	NI (FACU)
2.5	PYAS	PYRASA	Pyrola asarifolia	liverleaf wintergreen	Pyrolaceae	1	N	P	
2.5	PYCH	PYRCHL	Pyrola chlorantha	greenflowered wintergreen	Pyrolaceae	2	N	P	
2.5	VAMY2	VACMYR	Vaccinium myrtillus	whortleberry	Ericaceae	37	N	P	
3	ACLE9	ACHLET	Achnatherum lettermanii	Letterman's needlegrass	Poaceae	3	N	P	NI (UPL)
3	AGEX	AGREXA	Agrostis exarata	spike bentgrass	Poaceae	1	N	P	FACW
3	AGGI2	AGRGIG	Agrostis gigantea	redtop	Poaceae	1	I	P	FACW+
3	AGSC5	AGRSCA	Agrostis scabra	rough bentgrass	Poaceae	29	N	P	FAC
3	AGROS2	AGROST	Agrostis spp.	bentgrass	Poaceae	1	U	U	
3	ALAE	ALOAEQ	Alopecurus aequalis	shortawn foxtail	Poaceae	4	N	P	OBL
3	BLTR	BLETRI	Blepharoneuron tricholepis	pine dropseed	Poaceae	62	N	P	NI
3	BOGR2	BOUGRA	Bouteloua gracilis	blue grama	Poaceae	18	N	P	NI (UPL)
3	BRAN	BROANO	Bromus anomalus	nodding brome	Poaceae	1	N	P	NI
3	BRCA5	BROCAR	Bromus carinatus	California brome	Poaceae	4	N	P	NI (FACU)
3	BRCI2	BROCIL	Bromus ciliatus	fringed brome	Poaceae	163	N	P	FAC
3	BRPO2	BROPOR	Bromus porteri	Porter brome	Poaceae	17	N	P	
3	BROMU	BROMUS	Bromus spp.	brome	Poaceae	4	U	U	
3	CACA4	CALCAN	Calamagrostis canadensis	Canada reedgrass	Poaceae	2	N	P	OBL
3	CASTI3	CALSTRI	Calamagrostis stricta ssp. Inexpansa	northern reedgrass	Poaceae	10	N	P	FACW
3	CAAQ	CARAQU	Carex aquatilis	water sedge	Cyperaceae	5	N	P	OBL
3	CAGE	CARGEO	Carex geophila	White Mountain sedge	Cyperaceae	2	N	P	NI (FACW)
3	CAINH2	CARINOH	Carex inops ssp. heliophila	sun sedge	Cyperaceae	129	N	P	

Appedix B -- VCNP Vegetation Map Plant Species List

LF	Plants symbol	NHNM code	Scientific name	Common name	Family	N	O	D	WI
3	CAMI7	CARMIC	Carex microptera	smallwing sedge	Cyperaceae	30	N	P	FACW
3	CAOB4	CAROBT	Carex obtusata	obtuse sedge	Cyperaceae	5	N	P	
3	CAOC2	CAROCC	Carex occidentalis	western sedge	Cyperaceae	15	N	P	NI (FACW)
3	CAPE42	CARPEL	Carex pellita	woolly sedge	Cyperaceae	10	N	P	OBL
3	CAPR5	CARPRA	Carex praeegracilis	clustered field sedge	Cyperaceae	19	N	P	FACW+
3	CARO6	CARROS2	Carex rostrata	beaked sedge	Cyperaceae	3	N	P	OBL
3	CASI12	CARSIC	Carex siccata	dryspike sedge	Cyperaceae	52	N	P	NI (FACW)
3	CASI2	CARSIM	Carex simulata	analogue sedge	Cyperaceae	13	N	P	OBL
3	CAREX	CAREX	Carex spp.	sedge	Cyperaceae	30	N	P	
3	CAUT	CARUTR	Carex utriculata	Northwest Territory sedge	Cyperaceae	22	N	P	
3	CAWO	CARWOO	Carex wootonii	Wooton's sedge	Cyperaceae	31	N	P	
3	CILA2	CINLAT	Cinna latifolia	drooping woodreed	Poaceae	1	N	P	FACW+
3	CYFE2	CYPFEN	Cyperus fendlerianus	Fendler's flatsedge	Cyperaceae	6	N	P	FAC
3	DAPA2	DANPAR	Danthonia parryi	Parry's Danthonia	Poaceae	96	N	P	NI
3	DASP2	DANSPI	Danthonia spicata	Poverty oat grass	Poaceae	1	N	P	
3	DECE	DESCES	Deschampsia cespitosa	tufted hairgrass	Poaceae	37	N	P	FACW-
3	ELAC	ELEACI	Eleocharis acicularis	needle spikerush	Cyperaceae	2	N	P	
3	ELPA3	ELEPAL	Eleocharis palustris	common spikerush	Cyperaceae	8	N	P	OBL
3	ELQU2	ELEQUI	Eleocharis quinqueflora	fewflower spikerush	Cyperaceae	1	N	P	OBL
3	ELEOC	ELEOCH	Eleocharis spp.	spikerush	Cyperaceae	1	N	P	
3	ELEL5	ELYELY	Elymus elymoides	bottlebrush squirreltail	Poaceae	66	N	P	NI (FACU)
3	ELYMU	ELYMUS	Elymus spp.	wildrye	Poaceae	4	U	U	
3	ELTR7	ELYTRA	Elymus trachycaulus	slender wheatgrass	Poaceae	26	N	P	FAC
3	ELTRS	ELYTRAS	Elymus trachycaulus ssp. subsecundus	bearded wheatgrass	Poaceae	8	N	P	
3	ELTRT	ELYTRAT	Elymus trachycaulus ssp. trachycaulus	slender wheatgrass	Poaceae	14	N	P	FAC
3	ELPS	ELYPSE	Elymus x pseudorepens	false quackgrass	Poaceae	12	N	P	NI (FAC)
3	FEAR2	FESARI	Festuca arizonica	Arizona fescue	Poaceae	104	N	P	NI (FACU)
3	FEID	FESIDA	Festuca idahoensis	Idaho fescue	Poaceae	8	N	P	
3	FEPR	FESPRA	Festuca pratensis	meadow fescue	Poaceae	1	I	P	NI (FAC)
3	FESO	FESSOR	Festuca sororia	ravine fescue	Poaceae	6	N	P	
3	FETH	FESTHU	Festuca thurberi	Thurber's fescue	Poaceae	60	N	P	
3	GLBO	GLYBOR	Glyceria borealis	northern mannagrass	Poaceae	2	N	P	OBL

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LF	Plants symbol	NHNM code	Scientific name	Common name	Family	N	O	D	WI
3	GLGR	GLYGRA	<i>Glyceria grandis</i>	American mannagrass	Poaceae	1	N	P	OBL
3	HOBR2	HORBRA	<i>Hordeum brachyantherum</i>	meadow barley	Poaceae	10	N	P	FAC*
3	HOJU	HORJUB	<i>Hordeum jubatum</i>	foxtail barley	Poaceae	7	N	P	NI (FAC)
3	JUAR4	JUNARCB	<i>Juncus arcticus</i> var. <i>balticus</i>	Baltic rush	Juncaceae	58	N	P	OBL
3	JUDU2	JUNDUD	<i>Juncus dudleyi</i>	slender rush	Juncaceae	1	N	P	FACW-
3	JUEN	JUNENS	<i>Juncus ensifolius</i>	swordleaf rush	Juncaceae	2	N	P	
3	JUIN2	JUNINT	<i>Juncus interior</i>	inland rush	Juncaceae	1	N	P	FAC
3	JULO	JUNLON	<i>Juncus longistylis</i>	longstyle rush	Juncaceae	6	N	P	FACW
3	JUNCU	JUNCUS	<i>Juncus</i> spp.	Rush	Juncaceae	2	N	P	
3	KOMA	KOEMAC	<i>Koeleria macrantha</i>	prairie junegrass	Poaceae	92	N	P	NI (UPL)
3	LYSE3	LYCSET	<i>Lycurus setosus</i>	bristly wolfstail	Poaceae	2	N	P	
3	MEPO	MELPOR	<i>Melica porteri</i>	Porter's melicgrass	Poaceae	6	N	P	NI (UPL)
3	MUAN	MUHAND	<i>Muhlenbergia andina</i>	foxtail muhly	Poaceae	1	N	P	FAC*
3	MUMO	MUHMON	<i>Muhlenbergia montana</i>	mountain muhly	Poaceae	62	N	P	
3	MURI	MUHRIC	<i>Muhlenbergia richardsonis</i>	Mat muhly	Poaceae	25	N	P	
3	MUHLE	MUHLEN	<i>Muhlenbergia</i> spp.	muhly	Poaceae	3	U	U	
3	MUWR	MUHWRI	<i>Muhlenbergia wrightii</i>	spike muhly	Poaceae	23	N	P	FACU
3	ORAS	ORYASP	<i>Oryzopsis asperifolia</i>	roughleaf ricegrass	Poaceae	22	N	P	
3	ORHY	ORYHYM	<i>Oryzopsis hymenoides</i>	Indian ricegrass	Poaceae	1	N	P	FACU-
3	PASM	PASSMI	<i>Pascopyrum smithii</i>	western wheatgrass	Poaceae	2	N	P	NI (FACU)
3	PHAL2	PHLALP	<i>Phleum alpinum</i>	alpine timothy	Poaceae	3	N	P	
3	PHPR3	PHLPRA	<i>Phleum pratense</i>	timothy	Poaceae	32	I	P	FACU
3	POAN	POAANN	<i>Poa annua</i>	bluegrass	Poaceae	1	I	A	
3	POCO	POACOM	<i>Poa compressa</i>	Canada bluegrass	Poaceae	12	I	P	FACU
3	POFE	POAFEN	<i>Poa fendleriana</i>	muttongrass	Poaceae	18	N	P	NI (FACU)
3	POPA2	POAPAL	<i>Poa palustris</i>	fowl bluegrass	Poaceae	6	N	P	FAC
3	POPR	POAPRA	<i>Poa pratensis</i>	Kentucky bluegrass	Poaceae	124	N	P	FACU
3	POA	POA	<i>Poa</i> spp.	bluegrass	Poaceae	13	U	U	
3	SCPU	SCHPUR	<i>Schizachne purpurascens</i>	false melic	Poaceae	1	N	P	
3	SCSC	SCHSCO	<i>Schizachyrium scoparium</i>	little bluestem	Poaceae	1	N	P	FACU
3	STIPA	STIPA	<i>Stipa</i> spp.	needlegrass	Poaceae	1	N	U	
3	TOPAP3	TORPALP	<i>Torreyochloa pallida</i> var. <i>pauciflora</i>	pale false mannagrass	Poaceae	1	N	U	

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3	TRPA6	TRIPAL	Triglochin palustre	marsh arrowgrass	Juncaginaceae	1	N	P	OBL
3	TRSP2	TRISPI	Trisetum spicatum	spike trisetum	Poaceae	40	N	P	
	ACMI2	ACHMIL	Achillea millefolium	common yarrow	Asteraceae	130	N	P	FACU
4	ACMIO	ACHMILO	Achillea millefolium var. occidentalis	yarrow	Asteraceae	22	N	P	FACU
4	ACCO4	ACOCOL	Aconitum columbianum	Columbian monkshood	Ranunculaceae	1	N	P	FACW
4	ACRU2	ACTRUB	Actaea rubra	red baneberry	Ranunculaceae	3	N	P	FACW
4	AGAU2	AGOaur	Agoseris aurantica	orange agoseris	Asteraceae	32	N	P	
4	AGOSE	AGOSER	Agoseris spp.	agoseris	Asteraceae	3	N	P	
4	ALCE2	ALLCER	Allium cernuum	nodding onion	Liliaceae	20	N	P	NI (FACU)
4	ALCEN	ALLCERN	Allium cernuum var. neomexicanum	New Mexican nodding onion	Liliaceae	1	N	P	
4	ALGE	ALLGEY	Allium geyeri	Geyer's onion	Liliaceae	38	N	P	NI (FACU)
4	ALLIU	ALLIUM	Allium spp.	onion	Liliaceae	2	N	P	
4	AMRE	AMARET	Amaranthus retroflexus	redroot pigweed	Amaranthaceae	3	I	A	NI (FACU)
4	ANSE4	ANDSEP	Androsace septentrionalis	pygmyflower rockjasmine	Primulaceae	6	N	A	
4	ANMA5	ANTMAR	Antennaria marginata	whitemargin pussytoes	Asteraceae	2	N	P	
4	ANPA4	ANTPAR	Antennaria parvifolia	smallleaf pussytoes	Asteraceae	20	N	P	NI (UPL)
4	ANTEN	ANTENN	Antennaria spp.	pussytoes	Asteraceae	69	N	P	
4	AQCA2	AQUCAE	Aquilegia caerulea	Colorado columbine	Ranunculaceae	7	N	P	FACW-
4	AQEL	AQUELE	Aquilegia elegantula	western red columbine	Ranunculaceae	1	N	P	
4	AQUIL	AQUILE	Aquilegia spp.	columbine	Ranunculaceae	7	N	P	
4	ARDR	ARADRU	Arabis drummondii	Drummond's rockcress	Brassicaceae	6	N	P	FACU
4	ARHI	ARAHIR	Arabis hirsuta	hairy rockcress	Brassicaceae	1	N	A/P	
4	ARFE3	AREFEN	Arenaria fendleri	Fendler's sandwort	Caryophyllaceae	50	N	P	
4	ARFEF3	AREFENF	Arenaria fendleri var. fendleri	Fendler's sandwort	Caryophyllaceae	4	N	P	
4	ARLAS	ARELANS	Arenaria lanuginosa ssp. saxosa	spreading sandwort	Caryophyllaceae	4	N	P	
4	ARENA	ARENAR	Arenaria spp.	sandwort	Caryophyllaceae	1	N	U	
4	ARAN7	ARGANS	Argentina anserina	silverweed cinquefoil	Rosaceae	20	N	P	OBL
4	ARCA12	ARTCAM	Artemisia campestris	field sagewort	Asteraceae	1	N	P	FAC
4	ARCAP2	ARTCAMP	Artemisia campestris ssp. pacifica	Pacific wormwood	Asteraceae	1	N	P	NI
4	ARCA14	ARTCAR	Artemisia carruthii	Carruth's sagewort	Asteraceae	13	N	P	NI (FAC)
4	ARFR3	ARTFRA	Artemisia franserioides	ragweed sagebrush	Asteraceae	66	N	P	
4	ARLU	ARTLUD	Artemisia ludoviciana	Louisiana sagewort	Asteraceae	25	N	P	NI (FACU)

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4	ARLUL2	ARTLUDL	<i>Artemisia ludoviciana</i> ssp. <i>ludoviciana</i>	foothill sagewort	Asteraceae	1	N	P	NI (FACU)
4	ARLUM2	ARTLUDM	<i>Artemisia ludoviciana</i> ssp. <i>mexicana</i>	Mexican white sagebrush	Asteraceae	6	N	P	NI (FAC)
4	ARTEM	ARTEMI	<i>Artemisia</i> spp.	sagewort, sagebrush	Asteraceae	1	N	P	
4	ASTER	ASTER	<i>Aster</i> spp.	aster	Asteraceae	7	U	U	
4	BADI	BAHDIS	<i>Bahia dissecta</i>	ragleaf bahia	Asteraceae	1	N	P	
4	BAHIA	BAHIA	<i>Bahia</i> spp.	bahia	Asteraceae	1	U	U	
4	BITR	BIDTRI	<i>Bidens tripartita</i>	threelobe beggarticks	Asteraceae	3	N	A	
4	CAGU	CALGUN	<i>Calochortus gunnisonii</i>	Gunnison's Mariposa lily	Liliaceae	7	N	P	
4	CAPA10	CAMPAR	<i>Campanula parryi</i>	Parry's bellflower	Campanulaceae	10	N	P	FAC-
4	CARO2	CAMROT	<i>Campanula rotundifolia</i>	bluebell bellflower	Campanulaceae	86	N	P	FAC
4	CAMPA	CAMPAN	<i>Campanula</i> spp.	bellflower	Campanulaceae	1	N	P	
4	CABU2	CAPBUR	<i>Capsella bursa-pastoris</i>	shepherd's purse	Brassicaceae	4	I	A	UPL
4	CAMI12	CASMIN	<i>Castilleja miniata</i>	scarlet Indian paintbrush	Scrophulariaceae	8	N	P	FACU
4	CASTI2	CASTIL	<i>Castilleja</i> spp.	paintbrush	Scrophulariaceae	4	N	P	
4	CEAR4	CERARV	<i>Cerastium arvense</i>	mouseear chickweed	Caryophyllaceae	15	N	P	FACW
4	CEFOV2	CERFONV	<i>Cerastium fontanum</i> ssp. <i>vulgare</i>	big chickweed	Caryophyllaceae	2	I	B/P	
4	CHSE6	CHASER2	<i>Chamaesyce serpyllifolia</i>	thymeleaf sandmat	Euphorbiaceae	2	N	A	NI (FACU)
4	CHAT	CHEATR	<i>Chenopodium atrovirens</i>	pinyon goosefoot	Chenopodiaceae	3	N	A	
4	CHFR3	CHEFRE	<i>Chenopodium fremontii</i>	Fremont's goosefoot	Chenopodiaceae	17	N	A	NI (FAC)
4	CHGR2	CHEGRA	<i>Chenopodium graveolens</i>	fetid goosefoot	Chenopodiaceae	4	N	A	
4	CHLE4	CHELEP	<i>Chenopodium leptophyllum</i>	narrowleaf goosefoot	Chenopodiaceae	1	N	A	FACU
4	CHPR5	CHEPRA	<i>Chenopodium pratericola</i>	desert goosefoot	Chenopodiaceae	1	N	A	
4	CHRU	CHERUB	<i>Chenopodium rubrum</i>	red goosefoot	Chenopodiaceae	4	N	A	FACW
4	CHENO	CHENOP	<i>Chenopodium</i> spp.	goosefoot	Chenopodiaceae	4	U	U	
4	CIPA	CIRPAR	<i>Cirsium parryi</i>	Parry's thistle	Asteraceae	9	N	B/P	
4	CIRSI	CIRSIU	<i>Cirsium</i> spp.	thistle	Asteraceae	4	N	U	
4	CIUN	CIRUND	<i>Cirsium undulatum</i>	wavyleaf thistle	Asteraceae	1	N	P	UPL
4	CIVU	CIRVUL	<i>Cirsium vulgare</i>	bull thistle	Asteraceae	1	I	P	FACU
4	COLI2	COLLIN	<i>Collomia linearis</i>	tiny trumpet	Polemoniaceae	1	N	A	
4	CODI4	COMDIA	<i>Commelina dianthifolia</i>	birdbill dayflower	Commelinaceae	2	N	P	
4	COSC2	CONSCO	<i>Conioselinum scopulorum</i>	Rocky Mountain hemlockparsley	Apiaceae	5	N	P	
4	COMA4	CORMAC	<i>Corallorrhiza maculata</i>	summer coralroot	Orchidaceae	1	N	P	

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4	CORAL2	CORALL	Corallorrhiza spp.	coralroot	Orchidaceae	2	N	P	
4	COST	CORSTR	Corallorrhiza striata	hooded coralroot	Orchidaceae	1	N	P	
4	COAU2	CORAUR	Corydalis aurea	golden smoke	Fumariaceae	2	N	A	NI (FACU)
4	CRRU3	CRERUN	Crepis runcinata	fiddleleaf hawksbeard	Asteraceae	7	N	P	
4	CYFR2	CYSFRA	Cystopteris fragilis	brittle bladderfern	Dryopteridaceae	10	N	P	FACU+ (FACW)
4	DEINI2	DESINCI	Descurainia incana ssp. incisa	mountain tanseymustard	Brassicaceae	2	N	B	NI (FAC)
4	DEINV	DESINCV	Descurainia incana ssp. viscosa	mountain tansymustard	Brassicaceae	2	N	B	
4	DODEC	DODECA	Dodecatheon	shootingstar	Primulaceae	1	N	P	
4	DRAU	DRAAUR	Draba aurea	golden draba	Brassicaceae	16	N	P	
4	DRHE	DRAHEL	Draba helleriana	Heller's draba	Brassicaceae	8	N	B/P	
4	DRRE	DRAREC	Draba rectifruca	mountain draba	Brassicaceae	3	N	A/B	
							U		
							nk		
							no		
							w		
4	DRABA	DRABA	Draba spp.	whitlowgrass	Brassicaceae	7	n	U	
4	DRPA2	DRAPAR	Dracocephalum parviflorum	American dragonhead	Lamiaceae	1	N	P	FACU
4	EPAN2	EPIANG	Epilobium angustifolium	fireweed	Onagraceae	1	N	P	FAC
4	EPCI	EPICIL	Epilobium ciliatum	hairy willowherb	Onagraceae	9	N	P	FACW
4	EPHA	EPIHAL	Epilobium halleanum	glandular willowherb	Onagraceae	2	N	P	FAC+
4	EPILO	EPILOB	Epilobium spp.	willowherb	Onagraceae	2	N	U	FACW
4	EQAR	EQUARV	Equisetum arvense	field horsetail	Equisetaceae	2	N	P	FACW- (FACW)
4	ERDI4	ERIDIV	Erigeron divergens	spreading fleabane	Asteraceae	5	N	P	NI (FAC-)
4	EREX4	ERIEXI	Erigeron eximius	sprucefir fleabane	Asteraceae	46	N	P	
4	ERFL	ERIFLA	Erigeron flagellaris	trailing fleabane	Asteraceae	43	N	P	FAC-
4	ERFO3	ERIFOR	Erigeron formosissimus	beautiful fleabane	Asteraceae	66	N	P	
4	ERLO	ERILON	Erigeron lonchophyllus	shortray fleabane	Asteraceae	4	N	P	
4	ERSP4	ERISPE	Erigeron speciosus	aspen fleabane	Asteraceae	11	N	P	NI (FAC)
4	ERIGE2	ERIGER	Erigeron spp.	fleabane	Asteraceae	18	N	U	
4	ERSU2	ERISUB	Erigeron subtrinervis	threenerve fleabane	Asteraceae	9	N	P	
4	ERRA3	ERIRAC	Eriogonum racemosum	redroot buckwheat	Polygonaceae	2	N	P	
4	ERCI6	EROCIC	Erodium cicutarium	redstem stork's bill	Geraniaceae	1	I	A	NI (UPL)
4	ERCA14	ERYCAP	Erysimum capitatum	sanddune wallflower	Brassicaceae	4	N	P	NI (UPL)

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4	ERYSI	ERYSIM	<i>Erysimum</i> spp.	wallflower	Brassicaceae	1	N	B/P	
							U		
							nk		
							no		
							w		
4	EUPHO	EUPHOR	<i>Euphorbia</i> spp.	spurge	Euphorbiaceae	1	n	U	
4	FRAGA	FRAGAR	<i>Fragaria</i> spp	Strawberry	Rosaceae	15	N	P	
4	FRVE	FRAVES	<i>Fragaria vesca</i>	woodland strawberry	Rosaceae	85	N	P	
4	FRVEA2	FRAVESA	<i>Fragaria vesca</i> ssp. americana	woodland strawberry	Rosaceae	6	N	P	NI (FACU)
4	FRVIG2	FRAVIRG	<i>Fragaria virginiana</i> ssp.glauca	Virginia strawberry	Rosaceae	6	N	P	
4	FRSP	FRASPE	<i>Frasera speciosa</i>	showy frasera	Gentianaceae	1	N	P	NI (FACU)
4	FRASE	FRASER	<i>Frasera</i> spp.	green gentian	Gentianaceae	1	N	P	
4	GAAP2	GALAPA	<i>Galium aparine</i>	stickywilly	Rubiaceae	32	N	A	FACU (FAC)
4	GABO2	GALBOR	<i>Galium boreale</i>	Northern bedstraw	Rubiaceae	12	N	P	FAC-
4	GALIU	GALIUM	<i>Galium</i> spp.	bedstraw	Rubiaceae	8	N	U	
4	GEAF	GENAFF	<i>Gentiana affinis</i>	pleated gentian	Gentianaceae	19	N	P	
4	GEAMA	GENAMAA	<i>Gentianella amarella</i> ssp. acuta	autumn dwarf gentian	Gentianaceae	8	N	P	
4	GENTI2	GENTIA	<i>Gentianella</i> spp.	dwarf gentian	Gentianaceae	1	N	P	
4	GETH	GENTHE	<i>Gentianopsis thermalis</i>	Rocky Mountain fringedgentian	Gentianaceae	4	N	A	OBL*
4	GECA3	GERCAE	<i>Geranium caespitosum</i>	pineywoods geranium	Geraniaceae	17	N	P	NI (FAC)
4	GERI	GERRIC	<i>Geranium richardsonii</i>	Richardson's geranium	Geraniaceae	67	N	P	FAC
4	GERAN	GERANI	<i>Geranium</i> spp	geranium	Geraniaceae	6	N	P	
4	GEMA4	GEUMAC	<i>Geum macrophyllum</i>	largeleaf avens	Rosaceae	6	N	P	FACW
4	GETR	GEUTRI	<i>Geum triflorum</i>	old man whiskers	Rosaceae	5	N	P	FAC
4	GNEX	GNAEXI	<i>Gnaphalium exilifolium</i>	slender cudweed	Asteraceae	4	N	A	
4	GOOB2	GOOBL	<i>Goodyera oblongifolia</i>	western rattlesnake plantain	Orchidaceae	17	N	P	
4	GORE2	GOOREP	<i>Goodyera repens</i>	lesser rattlesnake plantain	Orchidaceae	4	N	P	
4	GOODY	GOODYE	<i>Goodyera</i> spp.	rattlesnake plantain	Orchidaceae	6	N	P	
4	HAFL2	HACFLO	<i>Hackelia floribunda</i>	manyflowered stickseed	Boraginaceae	1	N	P	FACU+
4	HELEN	HELENI	<i>Helenium</i> spp.	sneezeweed	Asteraceae	1	N	P	
4	HEMU3	HELMUL	<i>Heliomeris multiflora</i>	showy goldeneye	Asteraceae	3	N	P	NI (UPL)
4	HEVI4	HETVIL	<i>Heterotheca villosa</i>	hairy goldenaster	Asteraceae	11	N	P	
4	HEPA11	HEUPAR	<i>Heuchera parvifolia</i>	littleleaf alumroot	Saxifragaceae	1	N	P	NI (FAC)

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4	HEUCH	HEUCHE	Heuchera spp.	alumroot	Saxifragaceae	3	N	P	
4	HIFE	HIEFEN	Hieracium fendleri	yellow hawkweed	Asteraceae	4	N	P	
4	HIERA	HIERAC	Hieracium spp.	hawkweed	Asteraceae	7	N	P	
4	HULUN	HUMLUPN	Humulus lupulus var. neomexicanus	common hop	Cannabaceae	1	N	P	
4	HYFE	HYDFEN	Hydrophyllum fendleri	Fendler's waterleaf	Hydrophyllaceae	2	N	P	FACW
4	HYNE	HYMNEW	Hymenopappus newberryi	Newberry's hymenopappus	Asteraceae	5	N	P	
4	HYHO	HYMHOO	Hymenoxys hoopesii	Orange sneezeweed	Asteraceae	9	N	P	FAC+
4	HYRI	HYMRIC	Hymenoxys richardsonii	pingue hymenoxys	Asteraceae	2	N	P	NI (UPL)
4	HYSC5	HYPSCO	Hypericum scouleri	Scouler's St. Johnswort	Clusiaceae	2	N	P	NI (FAC)
4	HYSCN	HYPSCON	Hypericum scouleri ssp. nortoniae	Norton's St. Johnswort	Clusiaceae	4	N	P	
4	HYPER	HYPERI	Hypericum spp.	St. Johnswort	Clusiaceae	2	U	P	
4	IPAG	IPOAGG	Ipomopsis aggregata	skyrocket gilia	Polemoniaceae	5	N	P	NI (FACU)
4	IRMI	IRIMIS	Iris missouriensis	Rocky Mountain iris	Iridaceae	72	N	P	FACW
4	LASE	LACSER	Lactuca serriola	prickly lettuce	Asteraceae	1	I	B	FAC
4	LAOC3	LAPOCC	Lappula occidentalis	flatspine stickseed	Boraginaceae	2	N	A	NI (UPL)
4	LALAL3	LATLANL	Lathyrus lanszwertii var. leucanthus	Arizona peavine	Fabaceae	11	N	P	
4	LATHY	LATHYR	Lathyrus spp.	peavine	Fabaceae	79	N	P	
4	LEMI3	LEMMIN	Lemna minor	common duckweed	Lemnaceae	1	N	P	OBL
4	LEMNA	LEMNA	Lemna spp.	duckweed	Lemnaceae	2	N	P	
4	LEA2	LEPRAM	Lepidium ramosissimum	manybranched pepperweed	Brassicaceae		N	A	
4	LERAB2	LEPRAMB	Lepidium ramosissimum var. bourgeauanum	Bourgeau's pepperweed	Brassicaceae	2	N	A	
4	LEPID	LEPIDI	Lepidium spp.	pepperweed	Brassicaceae	2	U	U	
4	LIPO	LIGPOR	Ligusticum porteri	licorice-root	Apiaceae	1	N	P	
4	LIAQ	LIMAQU	Limosella aquatica	water mudwort	Scrophulariaceae	1	N	A/P	
4	LIBO3	LINBOR	Linnaea borealis	twinflor	Caprifoliaceae	2	N	P	
4	LILE3	LINLEW	Linum lewisii	prairie flax	Linaceae	1	N	P	
4	LIMU3	LITMUL	Lithospermum multiflorum	manyflowered gromwell	Boraginaceae	9	N	P	NI (UPL)
4	LOWR	LOTWRI	Lotus wrightii	Wright's deervetch	Fabaceae	1	N	P	NI (FACU)
4	LUAR3	LUPARG	Lupinus argenteus	silvery lupine	Fabaceae	2	N	P	UPL
4	LYAN2	LYCANN	Lycopodium annotinum	clubmoss	Lycopodiaceae	2	N	P	
4	MAGL2	MADGLO	Madia glomerata	mountain tarweed	Asteraceae	1	N	A	
4	MARAA	MAIRACA	Maianthemum racemosum ssp. amplexicaule	feathery false Solomon's seal	Liliaceae	8	N	P	FACU- (FACW)

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4	MAIAN	MAIANT	<i>Maianthemum</i> spp.	Wiggers mayflower	Liliaceae	5	N	P	
4	MAST4	MAISTE	<i>Maianthemum stellatum</i>	starry false Solomon's seal	Liliaceae	18	N	P	FACU (FACW)
4	MADI6	MATDIS	<i>Matricaria discoidea</i>	disc mayweed	Asteraceae	1	I	A	
4	MEAR4	MENARV	<i>Mentha arvensis</i>	wild mint	Lamiaceae	9	N	P	FACW
4	MECI3	MERCIL	<i>Mertensia ciliata</i>	mountain bluebells	Boraginaceae	1	N	P	FACW+
4	MEFR2	MERFRA	<i>Mertensia franciscana</i>	Franciscan bluebells	Boraginaceae	1	N	P	FACW
4	MELA3	MERLAN	<i>Mertensia lanceolata</i>	prairie bluebells	Boraginaceae	27	N	P	
4	MERTE	MERTEN	<i>Mertensia</i> spp.	bluebells	Boraginaceae	10	N	P	
4	MIGU	MIMGUT	<i>Mimulus guttatus</i>	seep monkeyflower	Scrophulariaceae	1	N	P	OBL
4	MIDE5	MIRDEC	<i>Mirabilis decipiens</i>	broadleaf four o'clock	Nyctaginaceae	5	N	P	
4	MIOX	MIROXY	<i>Mirabilis oxybaphoides</i>	smooth spreading four o'clock	Nyctaginaceae	3	N	P	
4	MIRAB	MIRABI	<i>Mirabilis</i> spp.	four o'clock	Nyctaginaceae	2	N	P	
4	MOHY3	MONHYP	<i>Monotropa hypopithys</i>	Pinesap	Monotropaceae	1	N	P	
4	OECA10	OENCAE	<i>Oenothera caespitosa</i>	tufted eveningprimrose	Onagraceae	1	N	P	
4	OEFL	OENFLA	<i>Oenothera flava</i>	yellow eveningprimrose	Onagraceae	2	N	P	
4	ORPA3	OREPAR	<i>Oreochrysum parryi</i>	Parry's goldenrod	Asteraceae	32	N	P	
4	ORLU	OROLUD	<i>Orobanche ludoviciana</i>	Louisiana broomrape	Orobanchaceae	1	N	P	NI (UPL)
4	OROBA	OROBAN	<i>Orobanche</i> spp.	broomrape	Orobanchaceae	1	N	P	
4	ORSE	ORTSEC	<i>Orthilia secunda</i>	sidebells wintergreen	Pyrolaceae	16	N	P	
4	ORLU2	ORTLUT	<i>Orthocarpus luteus</i>	yellow owlclover	Scrophulariaceae	12	N	A	FACU-
4	OSDE	OSMDEP	<i>Osmorhiza depauperata</i>	bluntseed sweetroot	Apiaceae	20	N	P	
4	OSMOR	OSMORH	<i>Osmorhiza</i> spp.	sweetcicely	Apiaceae	15	N	P	
4	OXALI	OXALIS	<i>Oxalis</i> spp.	woodsorrel	Oxalidaceae	7	N	P	
4	OXVI	OXAVIO	<i>Oxalis violacea</i>	violet woodsorrel	Oxalidaceae	18	N	P	
4	OXFE	OXYFEN	<i>Oxypolis fendleri</i>	Fendler's cowbane	Apiaceae	1	N	P	FACW
4	PAFE4	PACFEN	<i>Packera fendleri</i>	Fendler's ragwort	Asteraceae	9	N	P	
4	PAHA16	PACHAR	<i>Packera hartiana</i>	Hart's ragwort	Asteraceae	1	N	P	
4	PANE7	PACNEO	<i>Packera neomexicanus</i>	New Mexico groundsel	Asteraceae	3	N	P	NI (FACU)
4	PACKE	PACKER	<i>Packera</i> spp.	ragwort	Asteraceae	1	N	P	
4	PAPA8	PARPAL	<i>Parnassia palustris</i>	marsh grass of Parnassus	Saxifragaceae	1	N	P	
4	PEPR7	PEDPRO	<i>Pedicularis procera</i>	giant lousewort	Scrophulariaceae	7	N	P	FACU (FACW)
4	PEDIC	PEDICU	<i>Pedicularis</i> spp.	lousewort	Scrophulariaceae	2	N	P	

Appedix B -- VCNP Vegetation Map Plant Species List

LF	Plants symbol	NHNM code	Scientific name	Common name	Family	N	O	D	WI
4	PELO3	PENLON	<i>Pennellia longifolia</i>	longleaf mock thelypody	Brassicaceae	4	N	P	
4	PEBA2	PENBAR	<i>Penstemon barbatus</i>	beardlip penstemon	Scrophulariaceae	11	N	P	NI (UPL)
4	PERY	PENRYD	<i>Penstemon rydbergii</i>	Rydberg's penstemon	Scrophulariaceae	7	N	P	FAC
4	PEWH	PENWHI	<i>Penstemon whippleanus</i>	Whipple's penstemon	Scrophulariaceae	4	N	P	FACU+
4	PHHE2	PHAHET	<i>Phacelia heterophylla</i>	varileaf phacelia	Hydrophyllaceae	3	N	P	
4	PLMA2	PLAMAJ	<i>Plantago major</i>	common plantain	Plantaginaceae	2	I	P	FACW
4	PLANT	PLANTA	<i>Plantago</i> spp.	plantain	Plantaginaceae	2	I	P	
4	POFO	POLFOL	<i>Polemonium foliosissimum</i>	towering Jacobs ladder	Polemoniaceae	3	N	P	FAC
4	POLEM	POLEMO	<i>Polemonium</i> spp.	polemonium	Polemoniaceae	1	N	P	
4	POAM8	POLAMP	<i>Polygonum amphibium</i>	water knotweed	Polygonaceae	1	N	P	OBL
4	POAMS	POLAMPS	<i>Polygonum amphibium</i> var. <i>stipulaceum</i>	water smartweed	Polygonaceae	1	N	P	OBL
4	POAV	POLAVI	<i>Polygonum aviculare</i>	prostrate knotweed	Polygonaceae	2	I	A	FACW
4	PODO4	POLDUO	<i>Polygonum douglasii</i>	Douglas' knotweed	Polygonaceae	9	N	A	NI (FACU)
4	POLA4	POLLAP	<i>Polygonum lapathifolium</i>	curlytop knotweed	Polygonaceae	1	N	A	OBL
4	POPE3	POLPER	<i>Polygonum persicaria</i>	Lady's thumb	Polygonaceae	1	I	A	FACW+
4	PONO2	POTNOD	<i>Potamogeton nodosus</i>	longleaf pondweed	Potamogetonaceae	2	N	P	
4	PODI2	POTDIV	<i>Potentilla diversifolia</i>	varileaf cinquefoil	Rosaceae	3	N	P	FACW
4	POHI6	POTHIP	<i>Potentilla hippiana</i>	woolly cinquefoil	Rosaceae	107	N	P	
4	PONO3	POTNOR	<i>Potentilla norvegica</i>	Norwegian cinquefoil	Rosaceae	2	N	A	FAC
4	POPE8	POTPEN	<i>Potentilla pensylvanica</i>	Pennsylvania cinquefoil	Rosaceae	2	N	P	
4	POPU9	POTPUL	<i>Potentilla pulcherrima</i>	beautiful cinquefoil	Rosaceae	20	N	P	NI (FACW)
4	POTEN	POTENT	<i>Potentilla</i> spp.	cinquefoil	Rosaceae	1	N	P	
4	PRVU	PRUVUL	<i>Prunella vulgaris</i>	common selfheal	Lamiaceae	7	N	P	FACW-
4	PSMO	PSEMON	<i>Pseudocymopterus montanus</i>	alpine false springparsley	Apiaceae	76	N	P	NI (FAC)
4	PSMA11	PSEMAC	<i>Pseudognaphalium macounii</i>	Macoun's cudweed	Asteraceae	1	N	A/B	
4	PSJA2	PSEJAM	<i>Pseudostellaria jamesiana</i>	tuber starwort	Caryophyllaceae	2	N	P	NI (FACW)
4	PTAQ	PTEAQU	<i>Pteridium aquilinum</i>	western brackenfern	Dennstaedtiaceae	5	N	P	FACU
4	PTAN2	PTEAND	<i>Pterospora andromedea</i>	woodland pinedrops	Monotropaceae	3	N	P	
4	PYROL	PYROL	<i>Pyrola</i> spp.	wintergreen	Pyrolaceae	1	N	P	
4	RACA4	RANCAR	<i>Ranunculus cardiophyllus</i>	heartleaf buttercup	Ranunculaceae	59	N	P	OBL
4	RACY	RANCYM	<i>Ranunculus cymbalaria</i>	alkali buttercup	Ranunculaceae	2	N	P	OBL
4	RALO2	RANLON	<i>Ranunculus longirostris</i>	longbeak buttercup	Ranunculaceae	1	N	P	

Appedix B -- VCNP Vegetation Map Plant Species List

LF	Plants symbol	NHNM code	Scientific name	Common name	Family	N	O	D	WI
4	RAMA3	RANMAC	Ranunculus macranthus	large buttercup	Ranunculaceae	1	N	P	FACW
4	RANUN	RANUNC	Ranunculus spp.	buttercup	Ranunculaceae	1	N	P	FACW
4	RONA2	RORNAS	Rorippa nasturtium-aquaticum	watercress	Brassicaceae	1	I	P	OBL
4	ROPAF2	RORPALF	Rorippa palustris ssp. fernaldiana	Fernald's yellowcress	Brassicaceae	1	N	A/P	
4	ROSP4	RORSPH	Rorippa sphaerocarpa	roundfruit yellowcress	Brassicaceae	8	N	A	OBL
4	RUHI2	RUDHIR	Rudbeckia hirta	black-eyed Susan	Asteraceae	3	N	P	FACU
4	RULA3	RUDLAC	Rudbeckia laciniata	cutleaf coneflower	Asteraceae	1	N	P	FACW- (FACW)
4	RUAC3	RUMACE	Rumex acetosella	common sheep sorrel	Polygonaceae	10	I	P	FACW
4	RUCR	RUMCRI	Rumex crispus	curly dock	Polygonaceae	4	I	P	FACW
4	RUMEX	RUMEX	Rumex spp.	dock	Polygonaceae	5	U	U	
4	SACU	SAGCUN	Sagittaria cuneata	arumleaf arrowhead	Alismataceae	1	N	P	OBL
4	SARH2	SAXRHO	Saxifraga rhomboidea	diamondleaf saxifrage	Saxifragaceae	4	N	P	
4	SAXIF	SAXIFR	Saxifraga spp.	saxifrage	Saxifragaceae	3	N	P	
4	SCGA	SCUGAL	Scutellaria galericulata	hooded skullcap	Lamiaceae	1	N	P	OBL
4	SEAT	SENATR	Senecio atratus	tall blacktip ragwort	Asteraceae	1	N	P	
4	SEBI2	SENBIG	Senecio bigloviii	nodding ragwort	Asteraceae	4	N	P	NI (UPL)
4	SEER2	SENERE	Senecio eremophilus	desert groundsel	Asteraceae	16	N	P	
4	SENEC	SENECI	Senecio spp.	groundsel	Asteraceae	8	N	P	
4	SEWO	SENWOO	Senecio wootonii	Wooton's ragwort	Asteraceae	5	N	P	NI (FAC)
4	SICA3	SIDCAN	Sidalcea candida	white checkermallow	Malvaceae	3	N	P	FAC (FACW)
4	SIDR	SILDRU	Silene drummondii	Drummond's campion	Caryophyllaceae	1	N	P	
4	SISC7	SILSCO	Silene scouleri	Scouler's campion	Caryophyllaceae	6	N	P	
4	SISCP	SILSCOP	Silene scouleri ssp. pringlei	Pringle's campion	Caryophyllaceae	9	N	P	NI (FACW)
4	SILEN	SILENE	Silene spp.	catchfly	Caryophyllaceae	7	N	P	
4	SIMO2	SISMON	Sisyrinchium montanum	mountain blue-eyed grass	Iridaceae	8	N	P	FACW
4	SISYR	SISYRI	Sisyrinchium spp.	blue-eyed grass	Iridaceae	1	N	P	
4	SOMI2	SOLMIS	Solidago missouriensis	Missouri goldenrod	Asteraceae	11	N	P	
4	SOAS	SONASP	Sonchus asper	spiny sowthistle	Asteraceae	2	I	A	NI (FACW)
4	SPAN2	SPAANG	Sparganium angustifolium	narrowleaf burreed	Sparganiaceae	2	N	P	OBL
4	SPRO	SPIROM	Spiranthes romanzoffiana	hooded ladies tresses	Orchidaceae	3	N	P	OBL
4	STLO	STELON1	Stellaria longifolia	longleaf starwort	Caryophyllaceae	1	N	P	FAC (FACW)
4	STELL	STELLA	Stellaria spp.	starwort	Caryophyllaceae	2	N	U	

Appendix B -- VCNP Vegetation Map Plant Species List

LF	Plants symbol	NHNM code	Scientific name	Common name	Family	N	O	D	WI
4	SYAS3	SYMASC	Symphyotrichum ascendens	western aster	Asteraceae	14		P	
4	SYFAC	SYMFALC	Symphyotrichum falcatum var. commutatum	cluster aster	Asteraceae	1		P	
4	SYLAG	SYMLAEG	Symphyotrichum laeve var. geyeri	Geyer's aster	Asteraceae	10		P	
4	SYMPH4	SYMPHY	Symphyotrichum spp.	aster	Asteraceae	5		P	
4	TAOF	TAROFF	Taraxacum officinale	common dandelion	Asteraceae	128		P	FACU
4	THFE	THAFEN	Thalictrum fendleri	Fendler's meadowrue	Ranunculaceae	75		P	FACU-
4	THMOM3	THEMONM	Thermopsis montana var. montana	mountain goldenbanner	Fabaceae	28		P	
4	THAR5	THLASP	Thlaspi arvense	pennycress	Brassicaceae	1		A	
4	TRDU	TRADUB	Tragopogon dubius	yellow salsify	Asteraceae	5		P	
4	TRRE3	TRIREP	Trifolium repens	white clover	Fabaceae	44		P	NI (FAC)
4	TRIFO	TRIFOL	Trifolium spp.	clover	Fabaceae	5		P	
4	TRWO	TRIWOR	Trifolium wormskioldii	cows clover	Fabaceae	6		A/P	
4	URDI	URTDIO	Urtica dioica	stinging nettle	Urticaceae	12		P	NI (FACW)
4	VAED	VALEDU	Valeriana edulis	edible valerian	Valerianaceae	2		P	FAC
4	VALER	VALERI	Valeriana spp.	valerian	Valerianaceae	1		P	
4	VETH	VERTHA	Verbascum thapsus	common mullein	Scrophulariaceae	4		B	NI (FAC)
4	VEAM2	VERAME	Veronica americana	American speedwell	Scrophulariaceae	4		P	OBL
4	VEPEX2	VERPERX	Veronica peregrina ssp. xalapensis	hairy purslane speedwell	Scrophulariaceae	6		A	
4	VERON	VERONI	Veronica spp.	speedwell	Scrophulariaceae	2		U	
4	VIAM	VICAME	Vicia americana	American vetch	Fabaceae	64		P	NI (FACW)
4	VICIA	VICIA	Vicia spp.	vetch	Fabaceae	5		P	
4	VIAD	VIOADU	Viola adunca	hookedspur violet	Violaceae	1		P	
4	VICA4	VIOCAN	Viola canadensis	Canadian white violet	Violaceae	59		P	NI (FACW)
4	VINE	VIONEP	Viola nephrophylla	northern bog violet	Violaceae	2		P	FACW
4	VIOLA	VIOLA	Viola spp	Violet	Violaceae	9		P	
4	WOOR	WOORE	Woodsia oregana	Oregon woodsia	Dryopteridaceae	4		P	
4	WOODS	WOODSI	Woodsia spp.	cliff fern	Dryopteridaceae	3		P	
4	ZIEL2	ZIGELE	Zigadenus elegans	mountain deathcamas	Liliaceae	7		P	

APPENDIX C

Valles Caldera National Preserve Vegetation Classification

Table C-1. The Valles Caldera National Preserve vegetation classification used for the development of Valles Caldera Vegetation Map as of April, 2006. Plant associations are listed according to the Natural Heritage New Mexico state vegetation classification hierarchy with scientific name followed by common name. "Confid" refers to the confidence level for a given plant association: 1) Established type within the International Vegetation Classification (IVC) of NatureServe (2005) (usually with at least 5 plots representing the association); 2) a provisional type within the IVC, usually with at least two plots representing the association, and 3) a new type not yet included in the IVC, and usually only represented by one or two plots. "#Plots" refers to the number plots representing the type on the VCNP.

Plant Association Classification	Common name	Confid	#Plots
I. Upland			
II. Forest			
III. Cold Temperate Forest			
IV Rocky Mountain Subalpine Forest			
V. Subalpine Conifer Forest [Spruce-Fir Forest]			
VI. <i>Abies lasiocarpa</i> Forest Alliance	Subalpine Fir Forest Alliance		
<i>Abies lasiocarpa/Carex siccata</i> Forest	Subalpine Fir/Dryspike Sedge Forest	2	2
<i>Abies lasiocarpa/Erigeron eximius</i> Forest	Subalpine Fir/Sprucefir Fleabane Forest	1	3
<i>Abies lasiocarpa/Festuca thurberi</i> Forest	Subalpine Fir/Thurber's Fescue Forest	3	1
<i>Abies lasiocarpa/Moss</i> Forest	Subalpine Fir/Moss Forest	1	1
<i>Abies lasiocarpa/Vaccinium myrtillus</i> Forest	Subalpine Fir/Whortleberry Forest	1	1
<i>Abies lasiocarpa-Populus tremuloides/Erigeron eximius</i> Forest	Subalpine Fir-Quaking Aspen/Sprucefir Fleabane Forest	3	2
VI. <i>Picea engelmannii</i> Forest Alliance	Engelmann Spruce Forest Alliance		
<i>Picea engelmannii/Carex siccata</i> Forest	Engelmann's Spruce/Dryspike Sedge Forest	3	2
<i>Picea engelmannii/Danthonia parryi</i> Forest	Engelmann's Spruce/Parry's Danthonia Forest	3	1
<i>Picea engelmannii/Erigeron eximius</i> Forest	Engelmann's Spruce/Sprucefir Fleabane Forest	2	6
<i>Picea engelmannii/Moss</i> Forest	Engelmann's Spruce/Moss Forest	1	4
<i>Picea engelmannii/Vaccinium myrtillus</i> Forest	Engelmann's Spruce/Whortleberry Forest	3	2
<i>Picea engelmannii-Acer glabrum</i> Forest	Engelmann's Spruce-Rocky Mountain Maple Forest	1	2
V. Subalpine Broadleaf Forest [Aspen Forest]			
VI. <i>Populus tremuloides</i> Forest Alliance	Aspen Forest Alliance		
<i>Populus tremuloides/Bromus ciliatus</i> Forest	Quaking Aspen/Fringed Brome Forest	3	1
<i>Populus tremuloides/Carex rossii</i> Forest	Quaking Aspen/Ross' Sedge Forest	3	1
<i>Populus tremuloides/Carex siccata</i> Forest	Quaking Aspen/Dryspike Sedge Forest	2	2
<i>Populus tremuloides/Erigeron eximius</i> Forest	Quaking Aspen/Sprucefir Fleabane Forest	3	3
<i>Populus tremuloides/Festuca arizonica</i> Forest	Quaking Aspen/Arizona Fescue Forest	3	2
<i>Populus tremuloides/Festuca thurberi</i> Forest	Quaking Aspen/Thurber's Fescue Forest	2	3
<i>Populus tremuloides/Festuca thurberi-Danthonia parryi</i> Forest	Quaking Aspen/Thurber's Fescue-Parry's Danthonia	2	3
<i>Populus tremuloides/Muhlenbergia montana</i> Forest	Quaking Aspen/Mountain Muhly Forest	4	1
<i>Populus tremuloides/Poa pratensis</i> Forest	Quaking Aspen/Kentucky Bluegrass Forest	2	2
<i>Populus tremuloides/Thalictrum fendleri</i> Forest	Quaking Aspen/Fendler's Meadowrue Forest	1	5
<i>Populus tremuloides/Vaccinium myrtillus</i> Forest	Quaking Aspen/Whortleberry Forest	2	2
<i>Populus tremuloides-Acer glabrum</i> Forest	Quaking Aspen-Rocky Mountain Maple Forest	2	3
IV Rocky Mountain Montane Forest			
V. Rocky Mountain Upper Montane Conifer Forest [Mixed Conifer Forest]			
VI. <i>Abies concolor</i> Forest Alliance	White Fir Forest Alliance		
<i>Abies concolor/Bromus ciliatus</i> Forest	White Fir/Fringed Brome Forest	3	7
<i>Abies concolor/Carex rossii</i> Forest	White Fir/Ross' Sedge Forest	3	4
<i>Abies concolor/Carex siccata</i> Forest	White Fir/Dryspike Sedge Forest	3	1
<i>Abies concolor/Danthonia parryi</i> Forest	White Fir/Parry's Danthonia Forest	3	1
<i>Abies concolor/Erigeron eximius</i> Forest	White Fir/Sprucefir Fleabane Forest	1	2
<i>Abies concolor/Festuca arizonica</i> Forest	White Fir/Arizona Fescue Forest	1	2
<i>Abies concolor/Festuca arizonica-Danthonia parryi</i> Forest	White Fir/Arizona Fescue-Parry's Danthonia Forest	3	1
<i>Abies concolor/Jamesia americana</i> Forest	White Fir/Cliffbush Forest	2	5
<i>Abies concolor/Juniperus communis</i> Forest	White Fir/Common Juniper Forest	2	3

Appedix C -- VCNP Vegetation Classification

Table C-1 . VCNP Vegetation Classification (continued).

Plant Association Classification	Common name	Confid	#Plots
<i>Abies concolor</i> / <i>Mahonia repens</i> Forest	White Fir/Oregongrape Forest	1	11
<i>Abies concolor</i> / <i>Poa pratensis</i> Forest	White Fir/Kentucky Bluegrass Forest	3	2
<i>Abies concolor</i> / <i>Quercus gambelii</i> / <i>Carex inops</i> ssp. <i>heliophila</i> Forest	White Fir/Gambel's Oak/Sun Sedge Forest	3	1
<i>Abies concolor</i> / <i>Quercus gambelii</i> / <i>Festuca thurberi</i> Forest	White Fir/Gambel's Oak/Thurber's Fescue Forest	3	1
<i>Abies concolor</i> / <i>Thalictrum fendleri</i> Forest	White Fir/Fendler's Meadowrue Forest	3	5
<i>Abies concolor</i> / <i>Vaccinium myrtillus</i> Forest	White Fir/Whortleberry Forest	2	1
<i>Abies concolor</i> - <i>Acer glabrum</i> Forest	White Fir-Rocky Mountain Maple Forest	1	3
<i>Abies concolor</i> - <i>Quercus gambelii</i> Forest	White Fir-Gambel's Oak Forest	1	2
VI. <i>Abies concolor</i>-<i>Populus tremuloides</i> Forest Alliance	White Fir-Quaking Aspen Forest Alliance		
<i>Abies concolor</i> - <i>Populus tremuloides</i> / <i>Acer glabrum</i> Forest	White Fir-Quaking Aspen/Rocky Mountain Maple	3	1
<i>Abies concolor</i> - <i>Populus tremuloides</i> / <i>Bromus ciliatus</i> Forest	White Fir-Quaking Aspen/Fringed Brome Forest	3	1
<i>Abies concolor</i> - <i>Populus tremuloides</i> / <i>Carex siccata</i> Forest	White Fir-Quaking Aspen/Dryspike Sedge Forest	3	1
<i>Abies concolor</i> - <i>Populus tremuloides</i> / <i>Danthonia parryi</i> Forest	White Fir-Quaking Aspen/Parry's Danthonia Forest	3	1
<i>Abies concolor</i> - <i>Populus tremuloides</i> / <i>Festuca arizonica</i> Forest	White Fir-Quaking Aspen/Arizona Fescue Forest	3	1
<i>Abies concolor</i> - <i>Populus tremuloides</i> / <i>Festuca thurberi</i> Forest	White Fir-Quaking Aspen/Thurber's Fescue Forest	3	1
<i>Abies concolor</i> - <i>Populus tremuloides</i> / <i>Thalictrum fendleri</i> Forest	White Fir-Quaking Aspen/Fendler's Meadowrue Forest	3	1
VI. <i>Picea pungens</i> Forest Alliance	Blue Spruce Forest Alliance		
<i>Picea pungens</i> / <i>Bromus ciliatus</i> Forest	Blue Spruce/Fringed Brome Forest	3	3
<i>Picea pungens</i> / <i>Carex siccata</i> Forest	Blue Spruce/Dryspike Sedge Forest	3	1
<i>Picea pungens</i> / <i>Danthonia parryi</i> Forest	blue spruce/Parry's Danthonia Forest	3	5
<i>Picea pungens</i> / <i>Festuca arizonica</i> Forest	Blue Spruce/Arizona Fescue Forest	1	1
<i>Picea pungens</i> / <i>Festuca thurberi</i> Forest	Blue Spruce/Thurber's Fescue Forest	3	2
<i>Picea pungens</i> / <i>Fragaria vesca</i> Forest	Blue Spruce/Woodland Strawberry Forest	3	9
<i>Picea pungens</i> / <i>Juniperus communis</i> Forest	Blue Spruce/Common Juniper Forest	2	4
VI. <i>Pseudotsuga menziesii</i> Forest Alliance	Douglas Fir Forest Alliance		
<i>Pseudotsuga menziesii</i> / <i>Acer glabrum</i> Forest	Douglas-fir/Rocky Mountain Maple Forest	1	5
<i>Pseudotsuga menziesii</i> / <i>Bromus ciliatus</i> Forest	Douglas-fir/Fringed Brome Forest	2	3
<i>Pseudotsuga menziesii</i> / <i>Carex rossii</i> Forest	Douglas-fir/Beaked Sedge Forest	2	2
<i>Pseudotsuga menziesii</i> / <i>Danthonia parryi</i> Forest	Douglas-fir/Parry's Danthonia Forest	3	1
<i>Pseudotsuga menziesii</i> / <i>Jamesia americana</i> Forest	Douglas-fir/Cliffbush Forest	2	3
<i>Pseudotsuga menziesii</i> / <i>Juniperus communis</i> Forest	Douglas-fir/Common Juniper Forest	1	5
<i>Pseudotsuga menziesii</i> / <i>Mahonia repens</i> Forest	Douglas-fir/Oregongrape Forest	1	8
<i>Pseudotsuga menziesii</i> / <i>Thalictrum fendleri</i> Forest	Douglas-fir/Fendler's Meadowrue Forest	3	9
<i>Pseudotsuga menziesii</i> / <i>Vaccinium myrtillus</i> Forest	Douglas-fir/Whortleberry Forest	3	4
<i>Pseudotsuga menziesii</i> - <i>Populus tremuloides</i> / <i>Bromus ciliatus</i> Forest	Douglas-fir-Quaking Aspen/Fringed Brome Forest	3	2
<i>Pseudotsuga menziesii</i> - <i>Populus tremuloides</i> - <i>Acer glabrum</i> Forest	Douglas-fir-Quaking Aspen-Rocky Mountain Maple	3	2
<i>Pseudotsuga menziesii</i> - <i>Quercus gambelii</i> Forest	Douglas-fir-Gambel's Oak Forest	3	2
<i>Pseudotsuga menziesii</i> - <i>Quercus gambelii</i> / <i>Festuca arizonica</i> Forest	Douglas-fir-Gambel's Oak/Arizona Fescue Forest	3	1
V. Rocky Mountain Lower Montane Conifer Forest [Ponderosa Pine Forest]			
VI. <i>Pinus ponderosa</i> Forest Alliance	Ponderosa Pine Forest Alliance		
<i>Pinus ponderosa</i> / <i>Carex inops</i> ssp. <i>heliophila</i> Forest	Ponderosa Pine/Sun Sedge Forest	3	9
<i>Pinus ponderosa</i> / <i>Danthonia parryi</i> Forest	Ponderosa Pine/Parry's Danthonia Forest	2	11
<i>Pinus ponderosa</i> / <i>Festuca arizonica</i> Forest	Ponderosa Pine/Arizona Fescue Forest	1	10
<i>Pinus ponderosa</i> / <i>Festuca thurberi</i> Forest	Ponderosa Pine/Thurber's Fescue Forest	3	2
<i>Pinus ponderosa</i> / <i>Juniperus communis</i> Forest	Ponderosa Pine/Common Juniper Forest	2	2
<i>Pinus ponderosa</i> / <i>Juniperus communis</i> / <i>Carex inops</i> ssp. <i>heliophila</i> Forest	Ponderosa Pine/Common Juniper/Sun Sedge Forest	3	1
<i>Pinus ponderosa</i> / <i>Muhlenbergia montana</i> Forest	Ponderosa Pine/Mountain Muhly Forest	1	1
<i>Pinus ponderosa</i> / <i>Poa pratensis</i> Forest	Ponderosa Pine/Kentucky Bluegrass Forest	3	1
<i>Pinus ponderosa</i> - <i>Populus tremuloides</i> / <i>Festuca thurberi</i> <i>parryi</i> Forest	Ponderosa Pine-Quaking Aspen/Thurber's Fescue Forest	3	2
<i>Pinus ponderosa</i> - <i>Quercus gambelii</i> Forest	Ponderosa Pine-Gambel's Oak Forest	1	3

Appedix C -- VCNP Vegetation Classification

Table C-1 . VCNP Vegetation Classification (continued).

Plant Association Classification	Common name	Confid	#Plots
II. Woodland			
III. Cold Temperate Woodland			
IV Rocky Mountain Upper Montane Woodland			
V. Upper Montane Open Conifer Woodland [Limber Pine/Southwestern White Pine Forest]			
VI. <i>Pinus flexilis</i> Woodland Alliance	Limber Pine Woodland Alliance		
<i>Pinus flexilis/Juniperus communis</i> Forest	Limber Pine/Common Juniper Forest	1	4
IV Rocky Mountain Lower Montane -- Foothill Woodland			
V. Rocky Mountain Conifer Woodland			
VI. <i>Pinus edulis</i> Woodland Alliance	Pinyon Pine Woodland Alliance		
<i>Pinus edulis-Quercus gambelii</i> Woodland	Pinyon Pine-Gambel's Oak Woodland	1	1
II. Shrubland			
III. Mesophytic Shrubland			
IV Rocky Mountain Montane Shrubland			
V. Rocky Mountain Montane Deciduous Scrub			
VI. <i>Quercus gambelii</i> Shrubland Alliance	Gambel Oak Shrubland Alliance		
<i>Quercus gambelii/Carex inops ssp. heliophila</i> Shrubland	Gambel's Oak/Sun Sedge Shrubland	3	2
<i>Quercus gambelii/Holodiscus dumosus</i> Shrubland	Gambel's Oak/Rockspirea Shrubland	4	1
<i>Quercus gambelii/Prunus virginiana</i> Shrubland	Gambel's Oak/Common Chokecherry Woodland	3	3
<i>Quercus gambelii/Robinia neomexicana/Carex inops ssp. heliophila</i> Shrubland	Gambel's Oak/New Mexico Locust/Sun Sedge	3	2
VI. <i>Robinia neomexicana</i> Shrubland Alliance	New Mexico Locust Shrubland Alliance		
<i>Robinia neomexicana/Bromus ciliatus</i> Shrubland	New Mexico Locust/Fringed Brome Grassland	3	1
II. Grassland			
III. Mesophytic Grassland			
IV Rocky Mountain Subalpine and Montane Grassland			
V. Rocky Mountain Subalpine Grassland			
VI. <i>Danthonia parryi</i> Grassland Alliance	Parry's Danthonia Grassland Alliance		
<i>Danthonia parryi-Festuca arizonica</i> Grassland	Parry's Danthonia-Arizona Fescue Grassland	3	21
<i>Danthonia parryi-Poa pratensis</i> Grassland	Parry's Danthonia-Kentucky Bluegrass Grassland	3	1
<i>Danthonia parryi-Poa pratensis/Potentilla hippiana</i> Grassland	Parry's Danthonia-Kentucky Bluegrass/Woolly	5	1
VI. <i>Festuca thurberi</i> Grassland Alliance	Thurber Fescue Grassland Alliance		
<i>Festuca thurberi-Danthonia parryi</i> Grassland	Thurber's Fescue-Parry's Danthonia Grassland	2	5
<i>Festuca thurberi-Poa pratensis</i> Grassland	Thurber's Fescue-Kentucky Bluegrass Grassland	3	1
V. Rocky Mountain Montane Grassland			
VI. <i>Blepharoneuron tricholepis</i> Grassland Alliance	Pine Dropseed Grassland Alliance		
<i>Blepharoneuron tricholepis/Achillea millefolium</i> Grassland	Pine Dropseed/Common Yarrow Grassland	3	2
<i>Blepharoneuron tricholepis-Juncus balticus</i> Grassland	Pine Dropseed-Baltic Rush Grassland	3	2
<i>Blepharoneuron tricholepis-Muhlenbergia montana</i>	Pine Dropseed-Mountain Muhly Grassland	3	3
VI. <i>Festuca arizonica</i> Grassland Alliance	Arizona Fescue Grassland Alliance		
<i>Festuca arizonica-Blepharoneuron tricholepis</i> Grassland	Arizona Fescue-Pine Dropseed Grassland	2	5
<i>Festuca arizonica-Bouteloua gracilis</i> Grassland	Arizona Fescue-Blue Grama Grassland	2	6
<i>Festuca arizonica-Muhlenbergia montana</i> Grassland	Arizona Fescue-Mountain Muhly Grassland	1	9
<i>Festuca arizonica-Poa pratensis</i> Grassland	Arizona Fescue-Kentucky Bluegrass Grassland	3	1
VI. <i>Muhlenbergia montana</i> Grassland Alliance	Mountain Muhly Grassland Alliance		
<i>Muhlenbergia montana-Koeleria macrantha</i> Grassland	Mountain Muhly-Prairie Junegrass Grassland	3	2

Appedix C -- VCNP Vegetation Classification

Table C-1 . VCNP Vegetation Classification (continued).

Plant Association Classification	Common name	Confid	#Plots
<i>Poa pratensis</i> Grassland Alliance	Kentucky Bluegrass Grassland Alliance		
<i>Poa pratensis/Taraxacum officinale</i> Grassland	Kentucky Bluegrass/Common Dandelion Grassland	3	9
IV Plains-Mesa-Foothill Grassland			
V. Short Grass Steppe			
VI. <i>Bouteloua gracilis</i> Grassland Alliance	Blue Grama Grassland Alliance		
<i>Bouteloua gracilis-Poa pratensis</i> Grassland	Blue Grama-Kentucky Bluegrass Grassland	3	1
I. Riparian/Wetlands			
II. Forested Wetland			
III. Needle-leaved Deciduous Forested Wetland			
IV Needle-leaved Deciduous Forested Wetland, Temporarily Flooded			
V. Montane Needle-leaved Deciduous Forested Wetland, Temporarily Flooded			
VI. <i>Picea pungens</i> Temporarily Flooded Woodland Alliance	Blue Spruce Temporarily Flooded Woodland Alliance		
<i>Picea pungens/Alnus incana ssp. tenuifolia/Hydrophyllum fendleri</i> Forest	Blue Spruce/Thinleaf Alder/Fendler Waterleaf Forest	3	1
II. Scrub-Shrub Wetland			
III. Broad-Leaved Deciduous Scrub-Shrub Wetland			
IV Broad-leaved Deciduous Scrub-Shrub Wetland, Temporarily Flooded			
V. Montane Broad-leaved Deciduous Shrub Wetland, Temporarily Flooded			
VI. <i>Betula glandulosa</i> Shrubland Alliance	Dwarf Birch Forest Alliance		
<i>Betula glandulosa/Carex aquatilis/Lycopodium annotinum</i> Shrubland	Dwarf Birch/Water Sedge/Stiff Clubmoss Shrubland	3	1
II. Emergent Wetland			
III. Persistent Emergent Wetland			
IV Persistent Emergent Wetland, Seasonally Flooded			
V. Lowland Persistent Emergent Wetland, Seasonally Flooded			
VI. <i>Eleocharis palustris</i> Grassland Alliance	Common Spikerush Grassland Alliance		
<i>Eleocharis palustris-Carex pellita</i> Grassland	Common Spikerush-Woolly Sedge Grassland	3	1
VI. <i>Juncus arcticus</i> var. <i>balticus</i> Herbaceous	Baltic Rush Grassland Alliance		
<i>Juncus balticus-Agrostis gigantea</i> Grassland	Baltic Rush-Redtop Grassland	2	1
<i>Juncus balticus-Poa pratensis</i> Grassland	Baltic Rush-Kentucky Bluegrass Grassland	2	6
IV Persistent Emergent Wetland, Temporarily Flooded			
V. Montane Persistent Emergent Wetland, Temporarily Flooded			
VI. <i>Carex microptera</i> Grassland Alliance	Smallwing Sedge Grassland Alliance		
<i>Carex microptera-Carex pellita</i> Grassland	Smallwing Sedge-Woolly Sedge Grassland	3	2
VI. <i>Carex simulata</i> Grassland Alliance	Analogue Sedge Grassland Alliance		
<i>Carex simulata-Carex pellita</i> Grassland	Analogue Sedge-Woolly Sedge Grassland	3	1
VI. <i>Deschampsia cespitosa</i> Grassland Alliance	Tufted Hairgrass Grassland Alliance		
<i>Deschampsia cespitosa/Potentilla hippiana</i> Grassland	Tufted Hairgrass/Woolly Cinquefoil Grassland	3	1
<i>Deschampsia cespitosa-Carex aquatilis</i> Grassland	Tufted Hairgrass-Water Sedge Grassland	3	1
<i>Deschampsia cespitosa-Carex microptera</i> Grassland	Tufted Hairgrass-Smallwing Sedge Grassland	3	5
<i>Deschampsia cespitosa-Carex utriculata</i> Grassland	Tufted Hairgrass-Northwest Territory Sedge Grassland	2	4
<i>Deschampsia cespitosa-Juncus arcticus</i> var. <i>balticus</i> Grassland	Tufted Hairgrass-Baltic Rush Grassland	3	1
<i>Deschampsia cespitosa-Poa pratensis</i> Grassland	Tufted Hairgrass-Kentucky Bluegrass Grassland	3	1

VI.

Appedix C -- VCNP Vegetation Classification

Table C-1 . VCNP Vegetation Classification (continued).

Plant Association Classification	Common name	Confid	#Plots
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V.			
Montane Persistent Emergent Wetland, Seasonally Flooded			
VI. <i>Carex aquatilis</i> Grassland Alliance	Water Sedge Grassland Alliance		
<i>Carex aquatilis-Carex simulata</i> Grassland	Water Sedge-Analogue Sedge Grassland	2	1
VI. <i>Carex utriculata</i> Grassland Alliance	Northwest Territory Sedge Grassland Alliance		
<i>Carex utriculata/Monotypic</i> Grassland	Northwest Territory Sedge/Monotypic Grassland	3	2
<i>Carex utriculata-Carex microptera</i> Grassland	Northwest Territory Sedge-Smallwing Sedge Grassland	3	1
<i>Carex utriculata-Carex simulata</i> Grassland	Northwest Territory Sedge-Analogue Sedge Grassland	3	7
IV Persistent Emergent Wetland, Semipermanently Flooded			
V. Montane Persistent Emergent Wetland, Semipermanently Flooded			
VI. <i>Glyceria borealis</i> Grassland Alliance	Northern Mannagrass Grassland Alliance		
<i>Glyceria borealis/Monotypic Stand</i> Grassland	Northern Mannagrass/Monotypic Stand Grassland	3	1
I. Aquatic Vegetation			
II. Miscellaneous			
III. Miscellaneous			
IV Miscellaneous			
V. Miscellaneous			
VI. <i>Sparganium angustifolium</i> Herbaceous Aquatic Vegetation Alliance	Narrowleaf Burreed Herbaceous Aquatic Vegetation Alliance		
<i>Sparganium angustifolium/Glyceria borealis/Potamogeton nodosus</i> Herbaceous Aquatic Vegetation	Narrowleaf Burreed/Northern Mannagrass/Longleaf Pondweed Herbaceous Aquatic Vegetation	3	1