

National Park Service  
U.S. Department of the Interior

Natural Resource Program Center  
Fort Collins, Colorado



## Vascular Plant Survey

### *Pinnacles National Monument, California*

Natural Resource Technical Report NPS/SFAN/NRTR—2008/086



**ON THE COVER**

Pinnacles National Monument, California

Photograph Courtesy Andrea Williams

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## **Abstract**

In 2000 Pinnacles National Monument acquired several parcels totaling approximately 8,000 acres through a transfer from the Bureau of Land Management. The goal of the vascular plant survey was for the Pinnacles National Monument species list to contain at least 90% of species actually present in the Monument. Through field work in 2002 and 2003, we recorded 51 species new to the Pinnacles plant list, and collected, mounted and labeled approximately 150 specimens.

## Introduction and Background

The Natural Resource Challenge program supported the gathering of vascular plant inventory data on approximately 8,000 acres of land acquired in 2000 through a transfer from the Bureau of Land Management (BLM). No previous surveys had been done on this land. This lack of information was considered a data gap by the SFAN I&M program, and the inventory was funded in FY02 and FY03.

The parcels are located around the edge of the old Monument boundary. Despite the Monument's relatively small size of approximately 25,000 acres, there may be differences in plant composition and phenology between the west and east sides of the park, as well as between the north and south ends of the park. Factors influencing variability include ocean fog reaching the west and north portions of the park more frequently than the south or east and phenology in the south is often more advanced than in the north. The most apparent influence on species composition across the park is due to differences in aspect and soil characteristics, including soil moisture.

## Methodology and Results

Vegetation surveys were implemented by two botanists for two years. In 2002, surveys were conducted from February to the end of August on the 8,000 acres of new land. The surveyors located 23 species new to the Pinnacles list (Appendix 1); 19 (83%) were natives and 4 (17%) non-natives. Random intuitive surveys were used, as well as rapid assessment and releve plots, as defined by the California Native Plant Society and BLM (Sawyer and Keeler-Wolf 1995, Elzinga 1998). Ninety-seven new herbarium specimens were collected, identified, mounted and labeled. The Monument's plant checklist, last updated in 1996, was subsequently revised. To manage the new floristic information, flora databases were updated, the herbarium reorganized and updated, and a digital herbarium was initiated.

One species of *Streptanthus* that may be previously unknown to western science was found and documented. Genetic and taxonomic research is being conducted with this *Streptanthus* taxon by Roy Buck, a taxonomic expert on the genus.

In 2003, the same botanists surveyed for a second season from February through the end of June. This year the inventory work regularly employed releve plots, according to the California Native Plant Society and BLM protocols (Sawyer and Keeler-Wolf 1995, Elzinga 1998). These fed smoothly into the subsequent vegetation mapping project data. Twenty-eight species new to the Pinnacles list were located; 21 (78%) were natives and 6 (22%) non-natives; 9 (32%) were found in releve plots. Forty new herbarium specimens were collected, identified, mounted and labeled. GPS data, digital photographs, and site location information were gathered for reference collection specimens. The Monument's plant checklist was subsequently revised. New floristic information was entered into the database, herbarium and digital herbarium. In addition, photographs were taken of 82 families and 426 genera, for a combined total of 1,597 digital photographs of high quality and resolution (Figure 1.)



Figure 1. Indian hemp (*Apocynum cannabinum*) collected 7 June 2002, a new species to the park.

## Discussion

We were fortunate to have a skilled employee who photographed Pinnacles species with dedication. This has proven invaluable and is used not only as a plant identification tool available to all employees through the park's server, but also for interpretive displays, wildflower books and other materials.

Inventory work necessarily includes collecting specimens and properly housing them. We recommend ensuring that appropriate funding and time are proportioned to both the traditional housing of specimens and to digitally photographing not only the specimens but the species in the wild. In addition, digitizing the herbarium collection for use as part of a virtual museum has made the collection more accessible to staff while preserving the specimens.

Because of the positioning of the BLM-derived parcels at the perimeter of the older park lands, the surveyors often traveled extensively across older lands in order to reach the new acquisitions. Their survey results reflect this in that many species were found while traveling to and from starting points in the newly acquired parcels and/or releve plots. Random intuitive surveys and cross-country foot travel therefore appear to have been an important part of surveying at Pinnacles, in addition to defined methods such as the releve or rapid assessment plot.

Overall, the ratio of native to non-native species found in 2002 and 2003 is consistent with the prior plant list: about one-fifth of Pinnacles' species are non-native. We believe that the project objective of including 90% of Pinnacles National Monument's vascular plant species on our species list has been accomplished. However, this study does not incorporate inventory of 2000 additional acres acquired in 2006.

## Budget

<b>Budget Item</b>	<b>FY02</b>	<b>FY03</b>	<b>Total</b>
Personnel (GS-5, 6 months; GS 6, 1 year)	\$25,000	\$25,000	\$50,000
Equipment	\$500	\$500	\$1,000
Local Travel (GSA Vehicle)	\$2,000	\$2,000	\$4,000
<b>Total</b>	<b>\$27,500</b>	<b>\$27,500</b>	<b>\$55,000</b>



## Literature Cited

Elzinga, Caryl L. et al. 1998. *Measuring and Monitoring Plant Populations*. BLM Technical Reference 1730-1.

Sawyer, John O. and Todd Keeler-Wolf. 1995. *A Manual of California Vegetation*. Sacramento, CA: California Native Plant Society.

## Appendix 1. Species Summary, 2002-2003 Vegetation Inventory.

#	Plant species	Year	#	Native	Collection	Location	Population Description
1	<i>Castilleja brevistyla</i>	2002	1	yes	yes	Upper Chalone Creek	Large widespread population throughout northern portion of PINN.
2	<i>Mimulus congdonii</i>	2002	2	yes	yes	Maintenance Yard; Pig fence line, Gloria Canyon	Uncommon, but large healthy populations where found. Found in areas with disturbed chaparral.
3	<i>Stellaria pallida</i>	2002	3	no	yes	McCabe Canyon	Common throughout moist drainages.
4	<i>Amsinckia tessallata</i> var. <i>tessallata</i>	2002	4	yes	yes	Canyon North Willow Springs	Few individuals.
5	<i>Crassula tillaea</i>	2002	5	no	yes	Grassy Canyon	Large population. Found in other areas of PINN too.
6	<i>Eschscholzia hypaeoides</i>	2002	6	yes	yes	Grassy Canyon	Small population of 10-15 individuals.
7	<i>Eriogonum covilleianum</i>	2002	7	yes	yes	Grassy Canyon	Very large population found only on mudstone hills in Horse Valley.
8	<i>Collinsia barsifolia</i> var. <i>davidsonii</i>	2002	8	yes	yes	Grassy Canyon	Common throughout PINN.
9	<i>Camissonia boothii</i> ssp. ?	2002	9	yes	yes	Canyon North Willow Springs	Common species in landslides.
10	<i>Centrostegia thuberi</i>	2002	10	yes	yes	Canyon North Willow Springs	Few individuals found in landslides.
11	<i>Claytonia parviflora</i> ssp. <i>parviflora</i>	2002	11	yes	yes	McCabe Canyon	Scattered populations within monument; moist chaparral.
12	<i>Pectocarya penicillata</i>	2002	12	no	yes	McCabe Canyon	Few individuals found in highly disturbed streambed.
13	<i>Camissonia campestris</i> ssp. <i>campestris</i>	2002	13	yes	yes	McCabe Canyon	Few individuals found along streambed.
14	<i>Apocynum cannabinum</i>	2002	14	yes	yes	South Chalone Creek	Healthy populations found in upper Chalone crk.
15	<i>Asclepias eriocarpa</i>	2002	15	yes	yes	Grassy Canyon	Large population found scattered along dry creekbed.
16	<i>Eriogonum wrightii</i> var. <i>subscaposum</i>	2002	16	yes	yes	South Chalone	Many individuals found scattered throughout rocky slopes of the south side of South Chalone Peak.
17	<i>Eriogonum nudum</i> var. <i>indictum</i>	2002	17	yes	yes	Grassy Canyon	Few populations found scattered throughout PINN.
18	<i>Distichlis spicata</i>	2002	18	yes	no	E. Entrance Mdw	Large population in the East Entrance Meadow.
19	<i>Hydrocotyle umbellata</i>	2002	19	yes	no	Chalone Crk	Few individuals scattered along standing water in Chalone Creek.
20	<i>Eriogonum fasciculatum</i> var. <i>polifolium</i>	2002	20	yes	no	Chalone Crk	Few individuals found growing along upper Chalone Creek.
21	<i>Phoradendron macrophyllum</i>	2002	21	yes	yes	Chalone Crk	Few individuals found scattered through <i>Populus fremontii fremontii</i> .
22	<i>Potamogeton foliosus</i> var. <i>foliosus</i>	2002	22	yes	yes	Reservoir	Healthy population found growing in the Reservoir.
23	<i>Carduus pycnocephalus</i>	2002	23	no	no	All over Monument.	Scattered populations found throughout PINN.
24	<i>Veronica persica</i>	2003	1	no	yes	South Wilderness Rd.	Few individuals found in highly disturbed lowland area, next to Fire access Rd.
25	<i>Hesperolinon disjunctum</i>	2003	2	yes	no	Condor Gulch chaparral	Many individuals found scattered throughout chaparral; thought to be commonly mistaken for <i>H. micranthum</i> .

#	Plant species	Year	#	Native	Collection	Location	Population Description
26	<i>Mirabilis californica</i> var. <i>californica</i>	2003	3	yes	yes	South Wilderness	Extensive population found in remote canyon in the southern part of monument.
27	<i>Aspidotis californica</i>	2003	4	yes	yes	South Wilderness	Fern found in drainage beneath shelf in southern part of monument.
28	<i>Emmenanthe penduliflora</i> var. <i>rosea</i>	2003	5	yes	no	South Wilderness	Few individuals found near <i>E. penduliflora</i> var. <i>penduliflora</i> .
29	<i>Hesperevax acaulis</i> var. <i>acaulis</i>	2003	6	yes	yes	Horse Valley, Grassy Canyon	Extensive population discovered scattered throughout chaparral.
30	<i>Calystegia collina</i> var. <i>venusta</i>	2003	7	yes	no	West Entrance Meadow	Extensive populations in various areas; thought to be commonly mistaken for <i>C. subacaulis</i> var. <i>subacaulis</i> .
31	<i>Trifolium hirtum</i>	2003	8	no	no	Old Pinn Trail	Single plant; removed and disposed of.
32	<i>Plagiobothrys bracteatus</i>	2003	9	yes	yes	West Side Grasslands/Homesteads	Healthy populations found in at least two lowland areas within PINN.
33	<i>Zigadenus venenosus</i> var. <i>venenosus</i>	2003	10	yes	yes	Condor Gulch Access Rd.	Healthy populations found in at least two riparian areas within PINN.
34	<i>Mimulus rattanii</i>	2003	11	yes	no	N. Chalone Peak Trail	Scattered populations within monument; chaparral.
35	<i>Cynoglossum grande</i>	2003	12	yes	yes	Northwest corner of park	Healthy population found in Blue oak woodland in northern part of PINN.
36	<i>Senecio astephanus</i>	2003	13	yes	yes	North Wilderness	One or two plants found in northern PINN.
37	<i>Deinandra pentactis</i>	2003	14	yes	yes	South Wilderness	Few individuals found in southern PINN.
38	<i>Achnatherum speciosum</i>	2003	15	yes	yes	South Wilderness	Few individuals found in southern PINN.
39	<i>Galium californicum</i> ssp. ?	2003	16	yes	no	North Wilderness	At least two healthy populations found in Blue oak woodlands in northern part of PINN.
40	<i>Allophylum gilioides</i> ssp. <i>violaceum</i>	2003	17	yes	no	Frog Canyon	Fifteen to twenty individuals found in one population in Blue oak woodland.
41	<i>Melilotus alba</i>	2003	18	no	yes	Chalone Creek	Three individuals found scattered along riparian corridor.
42	<i>Chenopodium desiccatum</i>	2003	19	yes	yes	Dyke Reveg. Site	Handful of individuals found along channel bank.
43	<i>Piptatherum miliaceum</i>	2003	20	no	yes	Dyke Reveg. Site	Incipient population found along channel bank.
44	<i>Cuscuta californica</i> var. <i>californica</i>	2003	21	yes	no	Already in herbarium	Common throughout PINN, growing on buckwheat; may have been mislabeled on earlier herbarium specimens.
45	<i>Elatine californica</i>	2003	22	yes	yes	Reservoir	Large population.
46	<i>Chamaesyce maculata</i>	2003	23	no	no	Reservoir	Large population.
47	<i>Amaranthus californicus</i>	2003	24	yes	yes	Reservoir	Handful of plants along reservoir.
48	<i>Cyperus erythrorhizos</i>	2003	25	yes	yes	Reservoir	Twenty to thirty plants near reservoir.
49	<i>Grindelia camporum</i> var. <i>camporum</i>	2003	26	yes	yes	Chalone Creek YACC area	One plant in channel bed.
50	<i>Berula erecta</i>	2003	27	yes	yes	Sandy Creek	Few individuals found in Sandy Creek.
51	<i>Chenopodium ambrosioides</i>	2003	28	no	yes	Dyke Reveg. Site	Handful of individuals found along channel bank.



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