

Chapter 4: Affected Environment

Visitor Use and Opportunities

Access and Circulation

Pinnacles National Monument is accessed from State Route 25 on the east side, and State Route 146 on the west. State Route 25 (also known as Bolsa Road and the Airline Highway) is a two-lane road running from Peachtree Valley at State Route 198 in the south to U.S. Route 101 in Gilroy to the north. It parallels the San Andreas Fault, intersecting with Route 146, the entrance road to the east side of the monument. The nearest commercial air service is approximately 40 miles away in Monterey. The San Jose International Airport is approximately 80 miles away.

State Route 146 is located in Monterey and San Benito Counties, serving as an entryway to the Pinnacles National Monument from both the Salinas Valley on the west and off of State Route 25 on the east. Although both the eastern and western sections are part of Route 146, it is divided into two sections and does not go through the monument. The western part of Route 146 passes from U.S. Route 101 near Soledad to the west area of Pinnacles, terminating at west boundary of Pinnacles NM. The final 5 miles before ending at the monument boundary becomes narrow, winding and shrinking to one lane at some points. It is owned and maintained by the State of California. Lack of easements has prevented improvements such as widening shoulders or expanding parking areas outside of the monument boundary.

The eastern portion of Route 146 accommodates 70 percent of the vehicles coming to the monument on two 11-foot lanes with some portions of the road having no shoulders. This section of Route 146 is inside Pinnacles NM with a 90' right of way from Route 25 westward for approximately 4 miles to the existing cattleguard at the west end of Pinnacles Campground. Route 146 from Pinnacles National Monument to Route 25 in Bear Valley is eligible to be designated part of the California Scenic Highway System, and therefore has special protections under California law with respect to any planning and construction "to protect the scenic appearance of the scenic corridor (and) the band of land generally adjacent to the highway right-of-way" through regulation of development density, outdoor advertising, and the design of structures in the corridor.

Data on traffic volumes from a study in 2003 indicate that on both sides of the monument, traffic reaches a peak in the late morning (between 10:00 a.m. and noon) and falls steadily to zero by about 9:00 pm. Over 70% of vehicles are passenger cars, with very few vehicles over 22 feet long entering the monument; this is a likely reflection of the narrow winding roads, the difficulty in navigating larger vehicles, and visitors from the surrounding area being familiar with these conditions.

Because of its mountainous terrain, transportation to and through the monument is challenging. Pinnacles National Monument is divided into two separate districts (east and west). As noted above, although Route 146 enters the monument from both east and west, these segments do not connect. In between, hiking trails link the east and west districts. Several highway signs do not clearly identify the separation, and some visitors either arrive at the wrong destination or do not realize that there is no through road. The monument staff estimates that 99% of visitors arrive in cars, on motorcycles, or other vehicles, with a few arriving on bicycles, and a negligible amount arriving by foot. There is no public transit to the monument. The nearest towns are Soledad (8.5 miles west) on the west side, and Hollister (35 miles north) and King City on the east side. Transportation to and within the monument consists of vehicles on roads and a park-funded shuttle service. The high number of visitors during peak periods creates parking and road congestion problems, sometimes necessitating measures such as implementing a "one-in, one-out" system where no one can enter the monument until someone leaves. Previous studies have recommended various combinations of parking management strategies and implementation of a shuttle system.

Because there is no road through the monument, visitors choose to start and end their visits on either the east or west side of the monument. Road access is shown in the monument brochure, at information stations, and on the website.

The monument is open 24 hours a day. The east entrance gate is open continuously, while the west entrance is open from 7:30 a.m. until 6:00 p.m. (standard time) or 8:00 p.m. (daylight savings time). Seventy percent of visitors enter through the east entrance. While Pinnacles is open 24 hours a day, it is considered primarily a day-use park, with one camping area, Pinnacles Campground, on the east side.

The east side shuttle system is operated by monument personnel on peak weekends and holidays. There are two shuttle vehicles, an 18-passenger and 24-passenger (biodiesel) shuttle. The shuttle system is free to visitors accessing the monument facilities and trailheads.

The shuttles offer round-trip transportation every 30 minutes starting at the campground. Shuttle service typically starts on Presidents Day holiday weekend (February) and continues through Memorial Day holiday weekend (May). As funding permits, additional shuttle service is provided for Independence Day, Labor Day, Veteran’s Day, and Thanksgiving holiday weekends. The shuttle starts at the Pinnacles Campground and goes to the Bear Gulch and Peaks View areas before returning to the campground. Round-trip typically takes 45 minutes. Bear Gulch Area provides access to seven trail routes (Condor Gulch, High Peaks, North Chalone, Bear Gulch Caves/Reservoir, Rim, Moses Springs, and Bear Gulch), a picnic area, restrooms, water, interpretive wayside panels, and additional interpretive opportunities at the Nature Center. Peaks View Area provides access to five trail routes (Bench, South Wilderness, Bear Gulch, Hawkins Peak, and Old Pinnacles), picnic area, portable toilets, water, and interpretive wayside panels.

TRAFFIC VOLUMES

Traffic volumes are considered high on peak weekends and during late-winter, early-spring. Typically during these periods the east side parking areas are filled by 10 a.m. with the exception of the day use area at the campground. Generally there are eight to twelve times a year all parking in the east side is filled and wait times typically last one to two and a half hours.

On the west side of Pinnacles, the Chaparral parking typically fills by 10 a.m. during peak weekends and there are generally four to six times a year all parking is filled with wait times typically lasting one to two hours.

Whenever there becomes a time visitors must wait to enter the monument for a place to park, most visitors leave instead of waiting. For both sides of the monument, parking spaces generally start to become available around 3 p.m. with most all parking areas clearing by 9 p.m.

Monument Visitation

OVERVIEW

The Organic Act and NPS *Management Policies 2006* direct the National Park Service to provide visitor enjoyment opportunities that are uniquely suited to the superlative natural and cultural resources found in the monument. Different aspects of visitation and enjoyment are evaluated: visitor use and characteristics; range of recreational opportunities; opportunities for solitude and getting in touch with nature; opportunities for orientation, education, and interpretation; visitor access, including access for visitors with disabilities; and regional recreational opportunities.

TABLE 16: PARKING

Parking Lot Locations	# Spaces
East Side	
East Pinnacles Visitor Center/ Campground Store	40
Pinnacles Day Use Area	52
Pinnacles Campground (Campsites)	94
Peaks View Picnic Area	25
Old Pinnacles Trailhead Parking	12
Fire Wayside Parking	10
Bear Gulch Nature Center	74
Moses Spring	15
Total East Side	322
West Side	
Chaparral Ranger Station	56
Overflow	75
Visitor Contact Station	40
Total West Side	171
Total Combined	946

VISITATION TRENDS

Until 2010, annual visitation to Pinnacles National Monument had remained fairly stable since the 1970s (Figure 2). The number of visitors to the monument is estimated based on data from traffic counters. Vehicles are counted using traffic counters at both the east and west entrances. Based on traffic counter data, approximately two-thirds of visitor use occurs on the east side and one-third on the west side of the monument. Between 1990 and 2010, visitation averaged 173,000. There was a major drop in visitation in 1998 due to flooding which caused the monument to close for a period. Peak visitation years were in the early 1990s and in 2010 when visitation nearly reached 250,000 – the highest recorded visitation for the monument. Factors likely to affect visitation rates in any particular year include the weather, the economy, school schedules, and the price of gasoline (Nelson and Nygaard 2007). Based on the long-term trends, and the surrounding region’s population growth, it is likely that the monument’s visitation will gradually increase over the next 25 years. The towns and cities in Monterey and San Benito counties are expected to grow substantially during that time frame. Pinnacles National Monument is visited heavily by the local and regional population, so increasing population growth will likely have a similar effect on visitation.

The typical peak periods of visitation at Pinnacles are during the spring months of March through May when temperatures are cooler, streams are flowing, and long

hikes in the backcountry become more desirable. In addition, by March, visitors see and photograph many annual wildflowers that brighten the landscape. The summer brings much higher temperatures, which reduces the amount of visitation and visitors' length of stay in the monument.

VISITOR SURVEY PROJECT

In 2002, a Visitor Services Project was completed for Pinnacles National Monument. The visitor study provided information on visitor demographics and patterns and identified visitor concerns and suggestions for future planning. The survey was conducted between March 30 and April 7, 2002. A total of 511 questionnaires were distributed to visitors. Of those, 394 questionnaires were returned resulting in a 77% response rate. The following discussion identifies the characteristics of visitors identified from that survey.

Demographics

The largest proportions of U.S. visitors were from California (93 percent), and Washington (1 percent), with the number of international visitors too small to evaluate reliably. Of these visitors, fifty-seven percent of visitors were in the 26-55 age group. Another 23% of visitors were 15 or younger.

Visitors were asked about their ethnic and racial backgrounds. Seven percent responded that they were of Spanish/Hispanic/Latino ethnicity. Most respondents (94 percent) said they were of White racial background, while 8 percent said they were Asian, 3 percent were American Indian or Alaska Native, 1 percent were Black or African American.

The majority of visitors surveyed were part of a group of two or more people. Forty-two percent of visitor groups consisted of two people, while another 26 percent consisted of three or four people. Fifty-one percent of visitor groups were made up of family members and 25 percent were people traveling with friends.

Most visitors (79%) had visited the monument once in the past 12 months. When asked about visits to two to five years ago, 47% said they had not visited, 19% had visited once and 34% had visited two or more times. Visitors obtained information about the monument from previous visits (57%), friends, relatives or word of mouth (47%), and the Pinnacles web site (33%).

Length of Visit and Overnight Use

Most visitors spend less than one day at Pinnacles, although 19% spent two or three days. For 89% of visitors, visiting Pinnacles NM was the primary reason they came to the area (University of Idaho Park Studies Unit 2002). Visitors that stay overnight at Pinnacles



Photos (top to bottom): 1. Camping at the Pinnacles campground. 2. Hiking on the Bench Trail. 3. Climbing. NPS photos.

stay at the Pinnacles Campground. Most overnight stays are tent campers. However, RVs also stay in the Pinnacles Campground.

Recreation Activities and Sites Visited

The most common recreation activities visitors participated in were hiking (93%), viewing scenery, sightseeing, scenic drive (80%), viewing wildflowers (78%), and viewing wildlife (57%). Fourteen percent of visitors participated in rock climbing. The most commonly visited places were Bear Gulch Nature Center (56%), Central High Peaks (42%), Balconies Cave (40%) and the Bear Gulch Reservoir (32%). The most used trailheads were Chalone Creek (18%) and Bear Gulch Trail (16%) and the most often hiked trails included High Peaks (20%) and Old Pinnacles (11%).

Visitor Services

Most visitor groups (91%) rated the overall quality of visitor services, facilities, and recreational opportunities at Pinnacles National Monument as “very good” or “good.” One percent of visitor groups rated the overall quality as “very poor.” The most used services/facilities by survey respondents were the restrooms (91%), the visitor center (91%), and the monument brochure/map (90%). The services/facilities that received the highest combined proportions of “extremely important” and “very important” ratings included campgrounds (92%) and restrooms (90%). The services/facilities that received the highest combined proportions of “very

good” and “good” quality ratings were assistance from monument staff (93%) and the visitor center (93%).

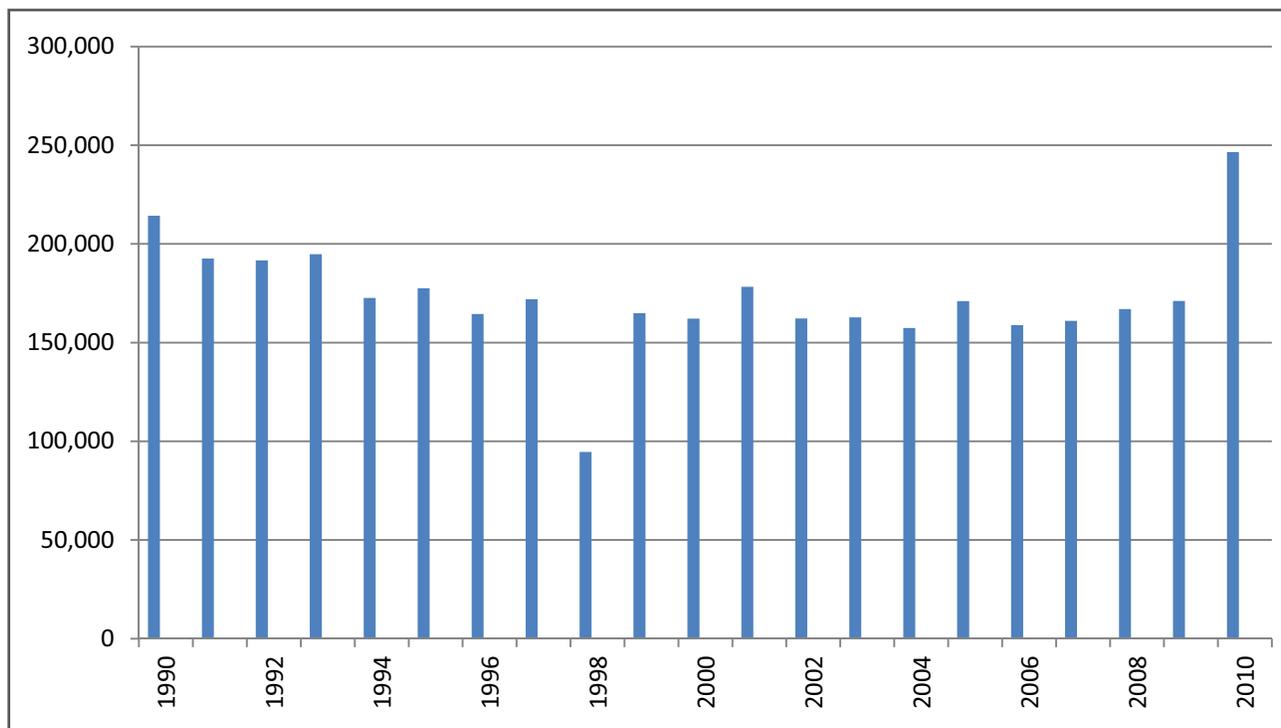
FEE COLLECTION

The current 7-day entry fee to Pinnacles National Monument is \$5 per car or motorcycle, which covers all people in the vehicle, or \$3 for those over 16 who enter by foot or bicycle. In 2005, the Recreational Fee Demonstration Plan was replaced by the Federal Lands Recreation Enhancement Act. One hundred percent of the fees collected at Pinnacles (average \$90,000 annually) stay within the monument to fund improvements that directly benefit visitors. The monument’s east side entrance station is located on Highway 146 just west of the campground. Entrance station staff collects fees, sells passes, and provides information and brochures to incoming visitors. The east side entrance station is open weekends on shoulder seasons and from Presidents Day to Memorial Day. Fees are also collected in honor boxes near the Bear Gulch Nature Center and East Pinnacles Visitor Center, when the entrance station or these facilities are closed. Fees are also collected at the new west side entrance station and West Pinnacles Visitor Contact Station.

Visitor Use Opportunities

Pinnacles National Monument provides a variety of visitor use opportunities and is an important recreation destination for the region. As indicated in the 2002

FIGURE 2: VISITATION 1990-2010



Visitor Survey, the most popular activities are hiking, viewing scenery, photography, camping, picnicking, rock climbing, and viewing wildflowers in the spring. The monument's hiking trails and technical rock climbing are internationally known. There are also a range of wilderness opportunities. Another draw to Pinnacles is the rare chance to see a California condor.

HIKING TRAILS

Pinnacles National Monument has a trail system that extends over 30 miles, ranging from easy, flat walks to more challenging, all-day hikes. These trails give visitors opportunities to experience geologic features, historic sites, scenic views, and wilderness. Several trails provide access between visitor facilities and popular areas within the monument. The monument's trails range from 1.7 to 9.7 miles in length. (See Visitor Access and Facilities Map). Trails include:

From Pinnacles Campground

- Bench Trail (East Pinnacles Visitor Center to Bear Gulch Day Use Area): 2.7 miles one way; portions are accessible.
- South Wilderness Trail: 1.0 mile to junction and up to 3.0 miles one way.
- East Pinnacles Visitor Center to Balconies Cave: 4.3 miles one way.

From Bear Gulch Day Use Area

- Moses Spring–Rim Trail Loop: 2.2 miles
- Condor Gulch–High Peaks Loop: 5.3 miles
- High Peaks–Bear Gulch Loop: 6.7 miles
- Bench Trail–Bear Gulch Trail: 2.3 miles one way
- Condor Gulch Trail: 1.7 mile one way
- Chalone Peak Trail: 8.6 miles round trip

From Old Pinnacles Trailhead

- Old Pinnacles Trail to Balconies Cave: 8.7 miles round trip
- South Wilderness Trail: 6.5 miles round trip

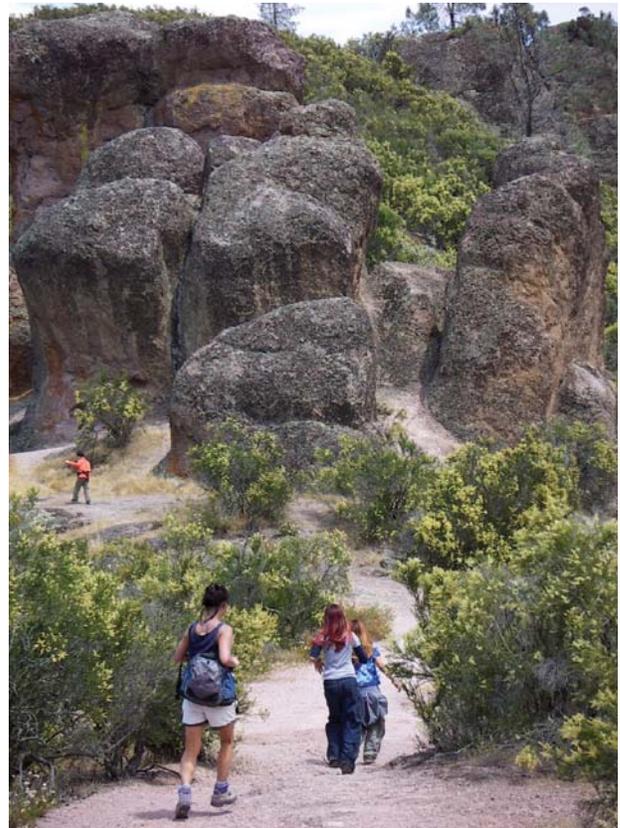
From West Side

- Balconies Cliffs–Balconies Cave Loop: 2.4 miles
- Juniper Canyon Loop: 4.3 miles
- North Wilderness Trail Loop: 9.7 miles
- High Peaks–Balconies Cave Loop: 8.4 miles

EXPLORING TALUS CAVES

There are two talus caves at Pinnacles: the Bear Gulch Cave and the Balconies Cave. The Bear Gulch Cave provides a home to a colony of Townsend's big-eared bats that and raise their young in the late spring and summer and overwinter there. A gate allows half of the cave to remain open for public access while protecting the colony of bats. A new trail begins near the middle

A group hikes along the Balconies Trail. NPS photo.



of the cave and connects with the Moses Spring Trail, which leads to the Bear Gulch Reservoir.

ROCK CLIMBING

Pinnacles National Monument offers a variety of climbing routes that range from easy top roping to the multi-pitch climbs along Machete Ridge. Climbing at Pinnacles has been popular since the 1930s, when first ascents were recorded by noted climbers, such as David Brower. Over 800 routes have since been recorded with difficulty ratings up to 5.14 based on the system used by the National Association of Search and Rescue.

Although many of Pinnacles routes have ratings that show they are easy or intermediate, some of these routes can be run out or have aging bolts or other safety issues. Climbing is not allowed on routes where rock fall or dropped gear might injure people using established hiking trails. This does not apply to routes above climber access or social trails. No power drills may be used for bolting. By longstanding tradition, the first ascent ethic at Pinnacles is "ground up." Rappel placed bolts are not part of the Pinnacles first ascent ethic. Voluntary seasonal closures at some formations help to protect nesting falcons and eagles. Use of brown or gray webbing for anchors helps to reduce

the scenic damage caused when left behind. A climbing management plan would be developed as part of the implementation of the GMP.

CAMPING

The Pinnacles campground was privately owned until March of 2006, when it was acquired by the NPS. The campground is located on the east side of the monument and offers tent and group camping, along with RV sites. There are approximately 149 campsites. Each tent and group campsite has a picnic table and fire ring. Most RV campsites have electrical hookups and share community tables and barbecue pits. Water is located throughout the campground. Oak trees provide shade at many campsites. Showers and a dump station are also available. A convenience store is located by the campground entrance. This camp store also contains the East Pinnacles Visitor Center. The swimming pool, constructed as part of the campground when it was privately-owned, has been retained. On some busy spring weekends, the campground is full. During most of the year, there are many campsites available. Interpretive staff conducts campfire programs in the amphitheater, located in the campground, seasonally on weekends depending on staffing.

PICNICKING

Picnic facilities are located in several areas within the monument. Day use picnic facilities are located near the campground, Peaks View, Bear Gulch, Moses Spring, and Chaparral. A small day use area will also be constructed as part of the new west side visitor facilities.

WILDLIFE AND LANDSCAPE VIEWING AND PHOTOGRAPHY

Many visitors come to view and photograph wildlife and landscapes. Pinnacles supports healthy populations of numerous wildlife. It is a refuge for endemic species and listed and special status species. Pinnacles includes a high diversity of habitats. Miles of hiking trails traverse these habitat edges, offering great views of vegetation, wildlife, and geologic features.

WILDERNESS

Most of the land within Pinnacles National Monument including many areas accessed by the trail system are in the Pinnacles wilderness. Under the Wilderness Act, they are managed for greater protection from development and other “wilderness values.” As defined by the Wilderness Act, “A wilderness, in contrast with those areas where man and his own works dominate the landscape is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain.”

ACCESSIBILITY AND SPECIAL POPULATIONS

Pinnacles offers a few interpretive opportunities for those with impaired hearing, sight, mobility, and cognitive function, as well as people with difficulty understanding English. Park staff has made great strides in making orientation, information, and some interpretive materials available in Spanish, however the monument is far from multi-lingual. Some additional accommodations beyond what is currently available at Pinnacles may be required by NPS standards in the next few years so visitors of all abilities and backgrounds can fully access interpretive opportunities. As directed by the standards of the Interpretive Development Program, interpretive activities are modified to best meet the physical and cognitive abilities and knowledge base of each visitor to the greatest extent possible.

Because of the rugged volcanic terrain, most natural areas of Pinnacles are not easily accessible beyond developed areas to visitors with physical disabilities. A section of the Bench Trail has recently been hardened and graded for wheelchair access. This gently rolling trail passes through oak woodlands and offers views of the High Peaks rock formation. The trailhead begins at the Peaks View Picnic Area near the east entrance of the monument. The Chaparral area near the west entrance also offers views of Pinnacles’ most spectacular geological formations from within or near the parking area. Wheelchair users can also access the Chaparral Picnic Area.

The visitor contact centers and restrooms on both the east and west sides of the monument are fully accessible. Parking areas have marked handicap spaces convenient to facilities. Picnic areas provide wheelchair access. Although the exhibits in the East Pinnacles Visitor Center include tactile displays, the only assistive material in Braille is the official park map and guide. As a result it is likely that a severely sight-impaired visitor would need assistance from a sighted person to fully experience the exhibits. This is especially true of non-personal interpretive services outside the nature center, including wayside exhibits, bulletin boards, and site bulletins, all of which depend entirely on two-dimensional images and written material.

Written interpretive materials throughout the monument and on the Internet benefit hearing-impaired visitors. In addition, NPS standards encourage sites to include assistive listening devices (headsets that narrate audio-visual programming at increased volume) as well as to provide interpreters fluent in sign language on request. Currently, neither of these services is available, and personal communication with hearing-impaired visitors occurs either through writing or a companion who knows sign language.

Pinnacles strives to provide appropriate informal interpretation to cognitively-impaired adults. Sometimes these visitors enjoy participating in the Junior Ranger program.

Pinnacles also receives moderate visitation from people for whom English is not their first language. Some of these visitors may know very little English. Spanish is the most common language next to English spoken by monument visitors. Pinnacles staff currently includes a few Spanish speakers, but efforts could be improved to increase staff Spanish language capability. There is a clear need for written materials to be translated into Spanish to enhance the interpretive experience as well as to provide for visitor safety. Bilingual information should also be available on the monument's website.

VISITOR FACILITIES

A variety of visitor facilities including a nature center, visitor center, trails, pull-outs and overlooks and a campground are available to monument visitors. Each district has visitor contact facilities.

East Side Campground Area

The campground was constructed in the 1970s and was operated by the previous landowner. The campground is currently operated by a National Park Service concessioner. Over the years, additional campgrounds within the monument have been removed by flooding or relocation (Moses Spring, Balconies Primitive Camp Area, Chalone Creek, and Chaparral Campgrounds). Visitor services previously provided at Bear Gulch Nature Center were relocated to the campground store in 2007. This location serves visitors more directly by providing wayfinding information nearer to the monument's east entrance. Though the area is similarly sized, there is less wall space for exhibits and current exhibits are substandard and/or obsolete. It also contains temporary exhibits designed to be used at outreach events. The monument's cooperating association, Western National Parks Association (WNPA), provides book sales.

Most visitors obtain information at the visitor center, including: personal assistance at the desk; maps, site bulletins, and information about Pinnacles and surrounding attractions. There are also daily loans of adventure packs for self-guided exploring and learning, exhibits, and other way-finding information. Most incoming public inquiries are also handled by visitor center staff.



Photos (top to bottom): 1. Bear Gulch Nature Center. 2. East Pinnacles Visitor Center. NPS photos.

Bear Gulch and Condor Gulch Area

The former Bear Gulch Visitor Center is now the Bear Gulch Nature Center. The Nature Center is open and operated by NPS, WNPA, and volunteers when staffing and funding permit. WNPA sales continue in the Nature Center. The building is outstanding, constructed of locally quarried rock by the Civilian Conservation Corps (CCC) in the 1930s and houses permanent and temporary exhibits that address the monument's primary interpretive themes. The nature center also contains a seismograph, touch table and other exhibits. This facility is the starting point for the majority of east side ranger guided walks and talks for visitors wishing to gain a greater insight and connection to monument resources.

West Side Visitor Facilities

The new west side visitor facility serves primarily as an orientation center; however, some space inside and outside the building is used for interpretation. The previous visitor contact station at Chaparral was deteriorating and exhibits needed replacement.

VISITOR INFORMATION

Prospective and virtual visitors can obtain information by accessing the monument's website. Information is also available via telephone, mail, and email requests. While basic information on rock climbing is available, there is currently no formal orientation program for climbers.

Education

CURRICULUM-BASED EDUCATIONAL PROGRAMS

Pinnacles began developing and presenting curriculum-based educational programs in 2002. The ability of Pinnacles to provide curriculum-based services for education groups has fluctuated over the past several years, in correlation with staff availability and the urgency of other priorities. Pinnacles offers one-day and multi-day programs. Each multi-day program consists of a pre-visit in the classroom, a visit to the monument, and a post-visit back in the classroom. Both programs are based on California State Content Standards for students in 4th through 8th grades.

For the one-day program, Pinnacles' education specialist collaborates with individual teachers to devise a program that is specifically tailored for the class. Using the park's resources as a guide, a teacher can choose a topic for their class visit focus. Typical topics include: Geology, Wildflowers, Botany, Caves and Bats, Cultural History, Condors, and their interconnectedness.

Teachers may also bring their class to Pinnacles and lead it themselves. An entrance fee waiver for school groups is available by application. All ranger-led programs contain a stewardship message and encourage awareness of the mission of the NPS.

Teachers are involved to a limited degree in the development and update of educational services at Pinnacles, through informal feedback and comment forms. Teacher involvement in the Pinnacles Education Program is well below expectations set by Director's Order # 6 and the Centennial Renaissance Action Plan. Increasing efforts in this area with teacher workshops held at the monument in the fall and/or winter inviting teachers to become more familiar with available materials and provide feedback for educational material updates would greatly benefit teachers, students, and the monument.

Pinnacles developed and held several pilot multi-disciplinary 6th grade camp programs beginning in spring 2008. This tent-based camp incorporated current park curriculum and added a social science curriculum relating to Native Americans and Early Settlers. Staffing levels over the past several years have not been adequate to allow Pinnacles to fill many of the frequent requests for outreach education programs. Many area schools face difficulties in funding field trips, therefore an increased ability to visit classrooms is becoming more important. The diverse student population in this region also includes several groups traditionally underserved by the NPS, such as Hispanics, Native Americans, and low-income rural and urban youth.

School group visiting. NPS photo.



Providing outreach programs in schools would allow Pinnacles to reach these populations directly, and would create an invaluable opportunity to increase stewardship and support in gateway communities.

Although the Pinnacles Education Program provides high-quality services in some areas, additional funding and development is needed to meet public demand. To reach students not currently served, it is necessary to increase program availability and develop services for other age groups and topics that address additional park themes. Encouraging more teacher involvement and providing more in-school (outreach) programs would make Pinnacles' resources more widely available and establish a greater role for the monument as an education partner in area communities.

Interpretation

INTERPRETIVE PLANNING

The monument developed a long-range interpretive plan (LRIP) in 2004. This plan is a component of the monument's comprehensive interpretive plan (CIP) and drives the annual implementation plan (AIP) as directed by NPS DO-6: Interpretation and Education. The LRIP is intended to provide long-term direction and focus for the interpretive program for Pinnacles. Together with the park-produced AIP and the interpretive database, it will form the CIP. The LRIP describes the monument's primary interpretive themes and visitor experiences, and recommends ways to facilitate those experiences through facility design, interpretive/informational media, personal services programs, and partnerships. The LRIP also establishes the framework for subsequent program planning, and media planning, design, and production over 7 to 10 years.

INTERPRETIVE PROGRAMS

In the past few years, the staff has strived to consistently train, coach, and audit formal interpretive programs to the standards of the interpretive development program, including encouraging and rewarding the submission of programs for national certification. Additionally, interpretive staff encourages all park staff to engage in the peer-review process. This provides greater opportunities for a wider range of visitors to connect both intellectually and emotionally to the meanings of Pinnacles' many and varied resources, as recommended by national standards for interpretation.

The concentration of visitation in the spring, in addition to staffing constraints in the off-season, focuses most public interpretive programming on the spring season. In spring and summer, Friday welcome programs and rotating campground programs are offered in the monument's campground amphitheater.

These programs allow an in-depth look at the monument's diverse interpretive themes, and can greatly enhance the depth of visitor understanding and appreciation. Ranger-guided walks through natural and historical areas and talks on a variety of monument interpretive themes are also offered on spring weekend days as staffing allows.

The monument conducts a year-round Junior Ranger program for children between 5 and 13 years of age via a self-guided Junior Ranger book and Adventure Pack that is reviewed with an interpretive ranger for a small award. In 2007, the monument was awarded a Junior Ranger Ambassador who assisted staff in the creation of a three tiered Junior Ranger book to better challenge a variety of learning styles and levels.

The number of visitors attending formal interpretive programs at Pinnacles has varied greatly over the last 7 years for which there is accurate data. The highest number of participants in formal programming occurred in 2006, with 4,383 participants. With the exception of 2002, when no formal programs were offered, the lowest participation occurred in 2003 with 1,866 participants. This wide fluctuation can be explained by the small size of permanent interpretive staff (between 1.0 and 1.5 FTE in recent years), the small size of seasonal staff (between 1.0 and 1.5 FTE), and the great reliance on volunteer and other labor through internship programs, particularly the Student Conservation Association (between 0 and 1.0 FTE).

As a result, there is currently a greater demand for formal interpretive programming than is able to be met by current staffing levels, especially in spring, on evenings in the summer and fall shoulder seasons, and by special request in the off-season.

NON-PERSONAL SERVICES: EXHIBITS, TRAIL GUIDES, PUBLICATIONS, AND WEBSITE

The wide variety of natural and cultural resources and interpretive themes at Pinnacles indicates a need for a variety of exhibits, publications, and webpages for visitors to learn about all the monument has to offer when that need cannot be met through personal contact.

Pinnacles has 13 wayside exhibits (large interpretive panels with graphics usually set on posts at waist height) as well as smaller interpretive and informational signs in the field. Interpretive wayside content highlights California condors, fire in the chaparral community, air quality, climbing, geology, and restoration activities. Many wayside panels were designed and installed prior to 1999. Future wayside exhibits would be replaced or added along the bottomlands and bench trail.



Photos (top to bottom): 1. Children from AMTB/ Coast Miwok/Southern Pomo tribes viewing an interpretive exhibit during the 2009 condor release event. Photo by Chuck Striplen. 2. Bird talk program. NPS photo. 3. Essay contest on Pinnacles NM stewardship. NPS photo.

The monument currently provides four self-guided trails with brochures: Moses Spring, Bear Gulch Seven Bridges, Balconies, and the Geology Trail. The brochures help to fill the gap created by a shortage of personal interpretive programming. Printing costs are subsidized by WNPA.

Site bulletins (specialty brochures providing in-depth interpretation of a subject) are available for all visitors, whether in person or on the web. These range from basic information about trails and sights to see, to in-depth historic and geologic background information and interpretation.

The Pinnacles website, at <http://www.nps.gov/pinn>, offers information, interpretation, modern and historic photos, maps, condor videos, and contact information. Although reliable annual statistics are not available, it can safely be assumed that Pinnacles receives thousands more “virtual visitors” annually than in-person visits, and that in-person visits to the monument can be greatly enhanced by a visit to the website.

SPECIAL EVENTS, INTERPRETIVE PARTNERS, AND COMMUNITY OUTREACH PROGRAMS

Although Pinnacles is not able to meet all community demands for participation in special events, fairs, and community meetings, there are several special events that occur in or out of the monument that attract a large number of participants.

There are several large in-park special events. The public release of California condors has occurred in either spring or fall. The Pinnacles Footprints event celebrates traditionally associated peoples of Pinnacles through lifeway demonstrations, educational activities, and experiential opportunities. The west side Community Celebration event, in partnership with local Hispanic, Native American, and civic organizations, engages the local community, the monument, and local organizations to share resources and stories. Other in-park events include Junior Ranger Day, International Migratory Bird Day, Earth Day, Wildflower Week, and Butterfly Weekend. In 2008, the monument celebrated its 100 year anniversary. Events included multiple celebrations on the monument history and culminated in re-dedication of the monument and an alumni celebration.

The largest out-of-park special events that garner annual participation from Pinnacles are the Salinas Valley Fair in May and the San Benito County Fair in September. Pinnacles participation in these events includes staffing booths for three to four days, with monument-related exhibits, videos, and children’s activities.

Pinnacles staff, both from the interpretation and resources divisions, are sometimes able to support other requests for outreach presentations and displays. These

have included the Soledad Expo, multiple partnership events with the Monterey Bay Aquarium, saddle horse parades, non-lead ammunition events, hunter education workshops, rancher's workshops, and scholarly articles and associated slide presentations for the George Wright Society and California Invasive Plant Society.

Given its size, Pinnacles has a moderate number of local public, private, and non-profit partner activities. These include attendance at local meetings of Pinnacles Partnership, San Benito Weed Management Area, California Condor Recovery Team, San Benito Fish and Game Commission, Rotary International, Chambers of Commerce, Hollister Downtown Association, San Benito County Parks Commission, as well as liaison to WNPA.

Hollister BLM lands, Los Padres National Forest, Hollister Hills State Recreation Area, and Henry Coe State Park have ecosystems similar to Pinnacles. As a result there are opportunities for crossover in interpretation of geology and ecology. Interpretive staff coordination is limited by staffing, funding, and time constraints within all four agencies. Nonetheless, monument interpretive staff has coordinated trainings and participated in outreach events with both agencies.

Although Pinnacles participates in monument and community outreach activities, there are opportunities to increase these activities to meet demand and to increase local support. Engaging new audiences, along with visitor and education services, should continue to expand in the future, especially in coordination with neighboring agencies and tribes to bolster a perspective that supports both the ecological and sociological continuity of the Monterey and San Benito counties people and lands. In support of this, the monument is currently working with the Pinnacles Partnership to develop an environmental outreach program for local communities and educational groups. The program focuses on educational stewardship and environmental principles.

Regional Recreational Opportunities

Pinnacles National Monument is located in both San Benito and Monterey Counties. Besides Pinnacles National Monument, there are federal and state and other parklands, including Bureau of Land Management lands, state parks, county and city-owned parks, historical sites, and special use areas that also provide important recreational amenities for local residents and visitors.

SAN BENITO COUNTY RECREATIONAL OPPORTUNITIES

There are approximately 144,416 acres of federal, state, county, and city park and open space areas in

San Benito County. These areas range from open space to developed parks that include a variety of amenities such as picnicking, swimming, rock climbing, off-road vehicle areas, hunting, bird watching, playgrounds, sports fields, and hiking.

In the 1992 General Plan, the County adopted a minimum parkland standard of 5.0 acres of parks for every 1,000 residents. The unincorporated parts of the county currently do not meet this standard; however, most residents living within or near the cities of Hollister and San Juan Bautista have adequate parkland. In 2008 there were approximately 2.5 acres of parkland per county resident (144,416 acres of total parkland and 57,784 people).

San Benito County owns or operates several parks. The four larger county parks include Bolado Park, Hernandez Reservoir, San Benito Historical Park, and Veteran's Memorial. Bolado Park houses the San Benito County Fairgrounds, seven miles southeast of Hollister. The fairgrounds host weddings, family picnics, dinners, dances, and conferences. In June the fairgrounds host the San Benito County Saddle Horse Rodeo. During the Fall it hosts the San Benito County Fair.

San Benito County has over 10 miles of bikeways and extensive rural road systems conducive to cycling. The majority of the bikeway segments are located in Hollister. There are approximately 8.5 miles of bike lanes in the county. The county has a proposal for a scenic trail to Pinnacles National Monument.

There are two public golf courses in San Benito County and two semi-private golf courses at a resort that accept public play. There are also several private recreation facilities in San Benito County. These include private camping, horseback riding, and hunting facilities. Private hunting clubs can be found extensively throughout county, including grasslands, wetlands, and water resource areas. These areas provide valuable wildlife habitat, passive recreational use in the non-hunting season, and cattle grazing. Other organizations, such as churches and civic groups also provide recreational facilities, including gymnasiums and performance halls. Most open space recreational uses on private land are camping facilities and RV parks.

A portion of the 1,210 mile Juan Bautista de Anza National Historical Trail traverses San Benito County and also passes through the Mission San Juan Bautista.

There are several areas managed by the BLM that provide a range of recreational opportunities, including:

- Clear Creek Management Area includes 63,000 acres and has been a popular area for off-highway vehicle (OHV) recreation, hunting, backpacking,

and sightseeing. Since May 2008 many public lands, including this area, have been closed to protect the public from naturally-occurring asbestos, an environmental hazard.

- San Benito Mountain Natural Area, which is open to hiking and hunting, contains San Benito Mountain and approximately 1,500 acres of non-public lands. The Panoche Hills area provides passive outdoor recreational activities, including hunting, camping, hiking, and wildlife viewing.
- Griswold Hills, consisting of approximately 10,000 acres of BLM-administered land, includes a 516-acre wilderness area containing oak-grassland habitat. The area is a popular destination area for hunters and for observing spring wildflowers.
- Tumey Hills, located east of New Idria Road, includes a network of hiking trails. A small portion of the area is within San Benito County.
- San Justo Reservoir and Recreation Area includes approximately 501 acres of recreation and 200 acres of water. Recreational activities at the reservoir include boating, fishing, windsurfing, sailing, mountain biking, picnic shelter areas, and other facilities. The recreation area is currently closed to the public due to a zebra mussel infestation.

There are three California State Parks (CSP) within San Benito County. The Hollister Hills State Vehicular Recreation Area (SVRA), located approximately six miles south of Hollister, includes bike, off-road, and obstacle course riding trails. The recreation area has group campsites, camping facilities, hiking trails, and a visitor center. San Juan Bautista State Historic Park is a nationally-recognized historic landmark located adjacent to Mission San Juan Bautista. The park has several structures built in the 1800s, including four historic museums. Fremont Peak State Park provides access to a one-mile hiking loop to Fremont Peak. The peak offers a panoramic view of the surrounding scrub oak woodlands, manzanita, toyon, and grassland habitats, the Gabilan Range, San Benito Valley, Monterey Bay, and Santa Lucia Mountains. The park includes an astronomical observatory and also provides picnic sites, camping, and wildlife viewing areas.

MONTEREY COUNTY RECREATIONAL OPPORTUNITIES

There are many parks and open space areas throughout Monterey County. The region includes an ecologically diverse landscape, including beaches, coastal dunes, wetlands, a dramatic rocky shoreline, redwood canyons and coastal peaks. Multiple agencies manage parks and open space in Monterey County, including

the NPS, USFS, BLM, U.S. Fish and Wildlife Service (USFWS), CSP, California Department of Fish and Game (DFG), Monterey Peninsula Parks District, Monterey County Parks Department and local municipalities. The County parks system encompasses about 10% of the County's total park acreage (Monterey County 2007).

Notable public lands and open space include the Los Padres National Forest, Fort Ord National Monument, Big Sur coast state parks, as well as Lake Nacimiento, Lake San Antonio, and Laguna Seca Regional Parks.

A portion of the 1,210 mile Juan Bautista de Anza National Historical Trail runs the length of Monterey County, passing through the Salinas Valley. The trail also passes through Fort Ord National Monument.

FEDERALLY-OWNED OR MANAGED LAND

The federal government owns and manages several hundred thousand acres of land in Monterey County, including the Los Padres National Forest, Fort Hunter Liggett, Pinnacles National Monument, Salinas River National Wildlife Refuge and a broad array of BLM lands.

- The Los Padres National Forest (LPNF), managed by the USFS, encompasses 1,752,400 acres, some of which is in Monterey County. LPNF extends along the coast from the Big Sur area of Monterey County to the western edge of Los Angeles County. Recreational activities permitted within the LPNF include hiking, camping, mountain biking, OHV travel, picnicking, and many other outdoor recreation activities. In addition, several large wilderness areas are within the LPNF, including the Ventana Wilderness.
- The Salinas River National Wildlife Refuge, managed by the USFWS, is located approximately 11 miles north of the City of Monterey. The refuge provides habitat for several threatened and endangered species. Although, the refuge is open to the public, there are no facilities except a parking lot and footpaths. Permitted activities include fishing, hunting (seasonal), photography and wildlife observation.
- The Elkhorn Slough National Estuarine Research Reserve (ESNERR) is one of 26 National Estuarine Research Reserves established nationwide as field laboratories for scientific research, estuarine education and habitat stewardship. The ESNERR is owned and managed by the CDFG and it is operated in partnership with the federal National Oceanic and Atmospheric Administration (NOAA) and the local, non-profit Elkhorn

Slough Foundation. The 1,400-acre reserve hosts programs that promote education, research, and conservation in Elkhorn Slough. There are five miles of trails that meander through oak woodlands, tidal creeks, and freshwater marshes. Elkhorn Slough is renowned for its birding opportunities during fall, winter, and spring.

- The BLM administers several thousand acres of land throughout Monterey County. Holdings include the newly designated Ford Ord National Monument on the Monterey Peninsula, and rugged land adjacent to the Los Padres National Forest. Equestrian activities, hiking and mountain biking are allowed in Fort Ord National Monument. The BLM land near the Los Padres National Forest is mostly inaccessible and is designated as a Wilderness Study Area.

CSP owns and operates 20 park units in Monterey County, totaling 17,567 acres. Most of these units are on or near the coast. Several of these state parks, including the Fort Ord Dunes State Park on the Monterey Peninsula, Marina State Beach in Marina, Point Lobos State Reserve in Carmel, and the Julia Pfeiffer Burns State Park on the Big Sur Coast attract visitors from throughout California and around the world.

The Monterey Peninsula Regional Park District (MPRPD) is a special parks and open space district located on the Monterey Peninsula. The MPRPD was entrusted to acquire lands for the express purpose of preserving open space and providing recreational opportunities. The MPRPD has protected approximately 20,000 acres of open space and acquired, or helped to acquire, a total of 24 parks and open spaces along the Monterey Peninsula, Big Sur Coast, Cachagua and Carmel Valley.

The Monterey County Parks Department is responsible for the operation and maintenance of a system of nine regional parks and two lakes encompassing over 12,155 acres of land and 10,000 acres of lakes. San Antonio Lake, located southeast of Jolon and Lockwood in the South County area, encompasses 12,000 acres and is the largest county-operated recreational area. Toro Park is the second largest county-operated park facility comprised of 4,783 acres. These county-owned public lands provide open space and recreational opportunities primarily on a regional scale for unincorporated areas of the County, rather than at the neighborhood level. Royal Oaks Park and Manzanita Park serve the residents of the north county. Jacks Peak and Toro Park are located adjacent to Monterey-Salinas Highway 68 and serve residents from the Monterey Peninsula and the Greater Salinas Area. San Lorenzo Park, just north of King City, serves residents of the Salinas Valley and county visitors. The

Lake San Antonio Recreation Area and the Laguna Seca Recreation Area/Raceway serve not only county visitors but also those from throughout California, the nation, and the world.

There are hundreds of miles of hiking, equestrian and bike trails in Monterey County. Notable hiking trails in Monterey County within the Los Padres National Forest include the Arroyo Seco trails, Little Sur Camp, the Blue Rock Ridge Trail, the Pine Ridge Trail and the Santa Lucia Trail. There are over fifty hiking trails within the Ventana Wilderness. Many of the state parks also contain extensive trail systems, including Andrew Molera State Park, Pfeiffer Big Sur State Park, Point Lobos State Reserve, and Fremont Peak State Park.

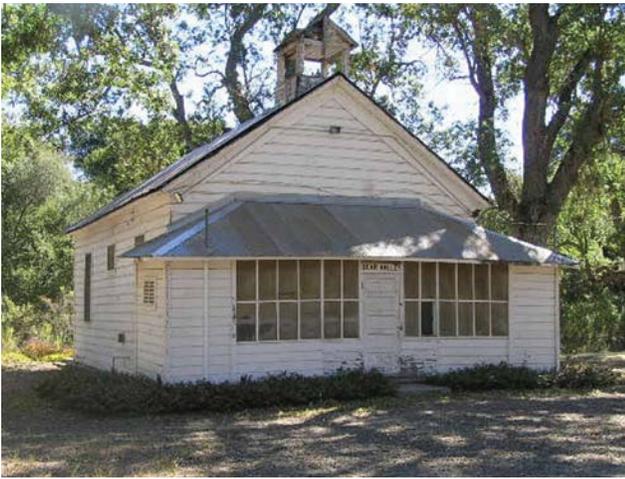
Facilities and Asset Management

Infrastructure and Facilities

Developed areas within Pinnacles National Monument include the monument operational facilities, infrastructure, and visitor facilities on both sides of the monument. Park operational facility areas include: Bear Gulch Headquarters area, the Pinnacles Campground on the east side, Chalone Housing/Maintenance area, the West Pinnacles Maintenance and Housing Area, Chaparral day use area, associated roads and parking, resource management facilities – monitoring equipment, and fencing. The monument's infrastructure, including water, wastewater, electrical and other utilities, is in relatively good condition.

A variety of visitor facilities including a nature center, visitor contact station, visitor center, trails, and campground are available. Each district has visitor contact facilities. On the east, the East Pinnacles Visitor Center, was relocated from Bear Gulch to the campground store in October 2007 and replaced with the Bear Gulch Nature Center. On the west, visitor services have been relocated to the new West Pinnacles Visitor Contact Station. Other visitor facilities include the amphitheater on the east side, a trails network, picnic areas, associated roads and parking.

Because of the monument's steep terrain, facilities are located in valley bottoms, very close to creek channels. In the past two decades, three major floods in the Chalone Creek watershed have occurred, including a 40-year flood event in 1998, which resulted in extensive damage to park facilities. These flood events, in 1995 and 1998, destroyed the road bridge to Bear Gulch, the trails operations building, a mobile home, a cabin and a 180 car parking area. Also severely damaged were roads, trails, and utilities. Repairs spanned through 2004 and included the construction of a replacement road bridge, a trails



Photos (clockwise from top left): 1. Historic Bear Valley School. 2. Ben Bacon House. 3. Butterfield Barn. NPS photos.

building, and repairs to infrastructure. The mobile home, cabin, and parking area have been replaced and relocated to West Pinnacles.

In 2006, the 2000-acre Pinnacles Ranch was acquired which included two historic ranch homesteads, numerous cross fences and a campground. The campground includes a pool, a store, trails, roads and parking areas. The former Pinnacles Ranch also contains a dump station, sewer systems, a water system, and several non-contributing buildings and structures (i. e. aircraft hangars, horse shade structures, riding paddocks, and mobile home trailers) that have been removed since acquisition.

In 2011, the 1.5-acre property containing the historic Bear Valley School building was acquired. The adjacent property includes associated utilities (water, waste water, electrical).

In January 2012, construction was substantially completed on the relocated visitor, maintenance and housing facilities in the west side of Pinnacles. This project removed the flood-prone Chaparral ranger contact station, maintenance facilities and housing unit. New facilities consist of an entrance station, visitor contact station, parking area, maintenance facility, housing units and associated utility systems and infrastructure. The replacement visitor contact station is in the process of being commissioned to receive a Platinum LEED rating. The housing units meet California energy standards and the utility systems are integrated with a control system. The new facilities are off-grid, not connected to commercial power, with power provided by a photovoltaic system.

Asset Management

The NPS defines an asset as a physical structure or grouping of structures, land features, or other tangible property which has a specific service or function. There are many types of assets in the National Park System, including roads, trails, buildings, and utility systems to monuments, marinas, fortifications, and aviation systems.

The Asset Business Plan (ABP) has been developed to help national parks better understand and manage their assets. Using the data on 'industry standard assets' (includes roads, trails, campgrounds, buildings, housing, water systems, and waste water systems) from the Facility Management Software System (FMSS), the ABP is a subsection of the larger Park Asset Management Plan (PAMP). The ABP allows managers to review their inventories, conduct analyses, and document requirements for operating and sustaining their portfolio of assets. This process supports budget formulation and is the first step in determining which resources are required to bring the portfolio of assets up to an acceptable condition and properly sustain it over time.

All of the monument's built assets have been prioritized through the use of the Asset Priority Index (API). API is a facility's relative importance to the monument. API is a key element to improving the management of a large portfolio of assets. Understanding the relative importance of assets enables leadership to make critical budgetary and programmatic decisions, putting often scarce resources to their best use. The NPS API ranks assets on a low-to-high scale ranging from 0 to 100. A lower API indicates the asset's contribution is less significant in relation to accomplishing the mission of the monument. Conversely a high API indicates that the asset contributes significantly to the mission of a national park unit.

The Facility Condition Index (FCI) is a simple measurement of a facility's relative condition at a particular point in time. The FCI uses a numeric rating system to rank assets. Dividing the collective value of all deficiencies (deferred maintenance) by the Current Replacement Value (CRV) provides the FCI. The calculated FCI is recorded within to document an asset's relative condition. Using the API and FCI together, park managers can begin to identify their highest priority assets that are in the worst condition by plotting the API and FCI.

In February 2012 there were 188 assets with an average FCI of 0.119 and an average API of 68. Since 2006, the newly acquired lands added 62 assets whose current average Asset Priority Index (API) rating is

Photos (top to bottom): 1. Resource Management facilities at Bear Gulch Headquarters. 2. Peaks View day use area. 3. Administrative space in East Pinnacles Visitor Center. 4. Maintenance facilities at Chalone. NPS photos.



FIGURE 3: FACILITY CONDITION INDEX - ASSET PRIORITY INDEX STATUS AT PINNACLES

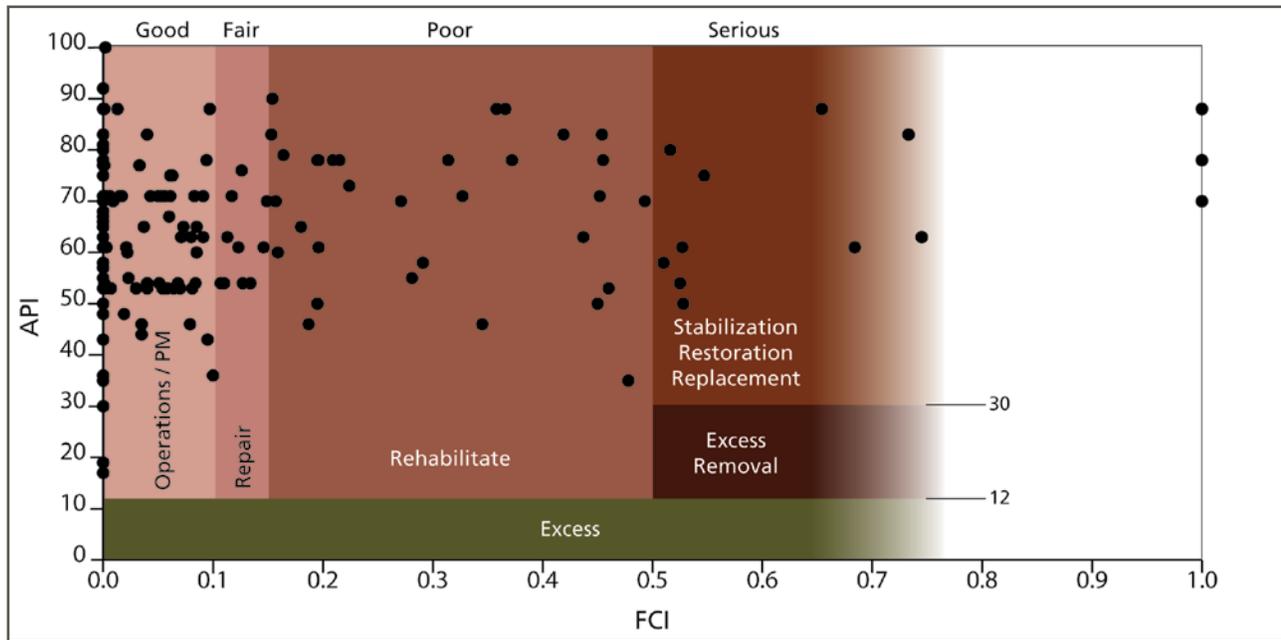


TABLE 17: PARK ASSETS

Asset Type	Count	Quantity	Unit of Measure	Average API	Average FCI
Roads	18	18.6	Miles	63	0.046
Parking Lots	19	143,566	Square Feet	68	0.194
Road Bridges	2	4,494	Square Feet	77	0.002
Trails	19	200,374	Linear Feet	66	0.081
Maintained Landscapes	9	2,056	Acres	76	0.121
Boundaries	2	617,760	Linear Feet	60	0.340
Buildings	60	32,418	Square Feet	58	0.151
Housing	13	16,509	Square Feet	48	0.085
Water Systems	5	62,300	Gallons per Day	80	0.158
Waste Water Systems	9	18,975	Gallons per Day	81	0.000
Utilities	6	1	Each	75	0.119
Other	4	1	Each	63	0.106
Grand Total	166			64	0.120

61. The current condition assessment for these assets conducted so far reveal an average Facility Condition Index (FCI) of 0.097.

In 2004 four mobile home trailers in the Chalone Creek area were replaced with newly constructed 8-bedroom dorm and a 2-bedroom duplex. Also constructed were a fire cache building, and a trails/carpentry shop. The average FCI is 0.036 and API is 55.

The facilities with the highest and worst FCI rating are Bear Valley School (1.433), Peaks View Parking Area (1.329) and the Bear Gulch Sewer System (1.144). Bear Valley School work is associated with bringing

a historic structure up to current building standards associated with future uses identified in the GMP alternatives. The Peaks View Parking Area is a Capital Improvement Project (CI) to change the gravel parking lot to paved and to install vault toilets to replace the rental portable toilets. Replacement of the Bear Gulch Sewer involves relocating the leach field out of a creek area. In addition, there is a high amount of deferred maintenance issues. Nearly 60% of Pinnacles’s deferred maintenance is based on FHWA maintained work orders.

Wilderness

The National Park Service is required to manage wilderness in accordance with the Wilderness Act of 1964. The Wilderness Act directs managers to preserve wilderness character and mandates that both wildness and naturalness be preserved. Congress defined wilderness as an area "...in contrast with those areas where man and his works dominate the landscape . . . as an area where the earth and its community of life are untrammelled by man." Congress further defined wilderness as an area that is "protected and managed so as to preserve its natural conditions. . . with the imprint of man's work substantially unnoticeable" and that wilderness "has outstanding opportunities for solitude or a primitive and unconfined type of recreation." Broadly, wilderness character can be considered to have four qualities:

- **Untrammelled:** Wilderness is an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain.
- **Natural:** Wilderness is an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions
- **Undeveloped:** Wilderness generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable;
- **Opportunities for Solitude or Primitive and Unconfined Recreation:** Wilderness has outstanding opportunities for solitude or a primitive and unconfined type of recreation.

The Wilderness Act also prohibits certain activities such as the use of motorized equipment, mechanical transport, structures or installations, and landing of aircraft unless it is considered the minimum requirement for the administration of the area for the purpose of preserving wilderness character. In addition, NPS policies mandate that management decisions affecting wilderness are consistent with the minimum requirement concept.

In 1976, 12,952 acres within Pinnacles National Monument were designated as wilderness under Public Law 94-567. This concept of assigning additional protections to sensitive natural areas at Pinnacles National Monument beyond fundamental NPS regulations precedes the 1964 Wilderness Act. In 1938, a Peregrine Falcon Sanctuary encompassing the Balconies area and lands north to that era's monument boundary was established to protect raptor nesting sites (unfortunately this area was unable to compensate for later regional decline of this species). The sanctuary's

purpose was to limit human disturbance of wildlife and later became the nucleus of Congressionally designated wilderness. Boundary adjustments and an additional Congressional designation in 2002 (Public Law 107-370) brought the total Pinnacles Wilderness acreage to 16,048 – over 65 % of the monument. The Wilderness Act and NPS Management Policies (2006) require analysis of wilderness suitability when new lands are acquired as well as wilderness stewardship plans for national park units with wilderness. Therefore, in compliance with these policies, a wilderness stewardship plan for the monument is called for by this GMP.

The Pinnacles Wilderness protects the natural character of central California's native ecosystems and provides opportunities to experience wildness in a region of expanding urban development. Exceptional examples of Coast Range chaparral vegetation communities and the remains of a relic volcanic field characterize the monument's wilderness. Pinnacles Wilderness is unique to the region in that it includes major geologic faults directly associated with the San Andreas Fault. Encompassing a range of geologic features and habitats, the topography within designated wilderness ranges from 760 feet to 3,269 feet on South Chalone Peak.

The Pinnacles Wilderness contributes to preserving America's heritage by providing access to large undeveloped areas where the visitor can catch a glimpse of natural processes at work and feel that they are a part of the larger community of life. Pinnacles Wilderness offers the ability for visitors to immerse themselves in natural elements of a remote, pristine central California landscape. The Pinnacles Wilderness offers visitors the reward of seeing expansive, high quality, undeveloped vistas; exploring natural landscapes large and small; breathing clean air; and the ability to experience outdoor solitude and natural quiet. The high concentration of aromatic native plants and flowers enhances the opportunity for visitors to immerse themselves within an untouched wilderness landscape. Each season features unique fragrances returning visitors expect to experience in this wilderness area. Pinnacles Wilderness also contains natural systems that allow visitors to witness and experience dynamic systems, i.e. floods, rockfall, earthquakes, etc., at work in a natural setting where the imprint of man is substantially unnoticeable. These qualities make Pinnacles Wilderness particularly valuable given the monument's 60-mile proximity to a major metropolitan region.

CONDITIONS AND USE

Native vegetation predominates the wilderness and benefits wilderness character in Pinnacles. Non-native invasive plants are present in wilderness areas, but not widespread. Prevention and early detection practices play a primary role to prevent the spread of nonnative invasive plants. Invasive plants enter the wilderness

through a variety of means from transport on shoes and socks, to transport via bird droppings. Administrative stock operations in wilderness areas can also introduce or spread non-native plants into wilderness.

The Chalone Peak Trail and North Wilderness Trail are the longest trails that extend into the Pinnacles Wilderness. Radiating out from developed corridors in Bear Gulch, the Chalone Creek drainage, and Chaparral, these trails have their origins during the era of CCC projects during the 1930s. Currently, the monument includes approximately 32 miles of maintained trails, the majority of which follow a course through wilderness. These wilderness trails provide visitors with opportunities to experience solitude and opportunities for reflection in primitive and unconfined settings.

Much of the Pinnacles Wilderness boundary reaches the monument boundary and is bordered by private ranches and vineyards. NPS staff periodically monitors the wilderness boundary to identify possible encroachments on its wilderness qualities. Threats of particular concern are trespass by livestock, off-road vehicles, and introduction of invasive plant species or non-native animals. Broader scale management concerns are air, water, noise, and light pollution from surrounding non-wilderness lands, although the rural nature of neighboring lands generally contributes to the overall high quality of these resources within wilderness (see Air Quality, Natural Sounds, Night Sky, and Water Resources sections).

Some resource management activities in wilderness can affect its untrammeled quality. At Pinnacles, a small number of prairie falcons (5-10 birds per year) are tagged and invasive plant control occurs along trails and riparian corridors throughout designated wilderness. Activities such as these are done primarily to enhance the natural qualities of wilderness.

Natural Resources

Air Quality

CONDITIONS AND SETTING

Air quality at Pinnacles is an important resource and, on good days, is a defining feature of the national monument. Not only does clean air directly enhance visitor enjoyment, but increased visibility of landscape features enhances visitor understanding and appreciation of natural systems. Pinnacles NM is located within California's North Central Coast Air Basin on the border of San Benito and Monterey counties. The monument, including over 16,000 acres of wilderness, is designated as a "Class I" airshed. The Clean Air Act affords Class I areas the greatest protection against air pollution. This designation requires federal land managers to protect the monument's air quality-related values, including visibility, against air pollution impacts.

Air quality in the monument varies from excellent to poor, depending on the pollutants being measured, the location in the monument, the season and time of day, the wind direction and other factors. The pollutants of most concern to monument air quality are fine particulates, ozone, sulfates and nitrates. Good air quality is aided by the proximity to the coast (35-40 miles) and the surrounding rural landscapes. Pinnacles enjoys good air quality on most days. Monitoring data have shown a trend of cautious stability. Of particular concern are the recent and ongoing growth of urban areas within the Salinas Valley and the southward expansion of the San Francisco Bay metropolitan area. This growth is reducing the distance between urban pollution sources and the monument.

Photos (left to right): 1. A Brown Elfin butterfly nectars on bush lupine. Photo by Paul G. Johnson. 2. Head detail of a California condor sub-adult. Photo by Gavin Emmons © 2011.



Pinnacles National Monument lies within an area of low population density in the Gabilan Mountain Range. These mountains are part of the central California Coast Range complex, which run roughly parallel to the coastline east and south of Monterey Bay. Areas adjacent to the monument are primarily agricultural; all but two of the towns or cities within 30 miles currently have fewer than 15,000 inhabitants. The exceptions are Salinas, 26 miles to the northwest with a population of 151,000; and Hollister, 23 miles north with a population of 35,000. The Salinas Valley to the west is the source of most air pollution that typically reaches Pinnacles. Seasonally, air quality at Pinnacles is also affected by industrial and urban sources from San Jose and the Silicon Valley 65 miles to the north, an area of well over one million inhabitants.

Although still superior to that in many parts of the country, visibility in the monument is sometimes impaired by light-scattering pollutants (haze). Ozone pollution is also of concern. Several plant species that occur at Pinnacles, including blue elderberry (*Sambucus mexicana*) and Douglas' sagewort (*Artemisia douglasiana*), are known to be sensitive to ozone. In addition, Pinnacles NM historically has had a great abundance and variety of lichens, which give the namesake pinnacle rocks their varied hues. Many of the species present are known to be sensitive to air pollution and may already be impacted (Benson 2003).

CLIMATE

The region's climate is strongly influenced by the North Pacific High Pressure System, which typically migrates north each spring and south each autumn, influencing the direction of winds and storm systems arriving from the ocean. At Pinnacles, summer is the season when the most light-scattering particulates are in the air; summers are typically hot and dry during the day, with infrequent winds. However, coastal fog often moves inland during the evenings and night, providing some mixing. Additionally, during periods of low air movement, pressure sometimes forms inland, leading to irruptions of easterly winds. These winds push pollutants out to sea, but may also carry dust and particulates from the San Joaquin Valley into Pinnacles. Most winds in the region, however, result from a combination of the offshore high-pressure system and lower pressure inland, resulting in westerly to northwesterly winds throughout much of the year. Less frequently, northerly winds and a persistent inversion layer draw air pollutants from Silicon Valley and the Santa Clara Valley into the monument.

MONITORING

The NPS Air Resources Division and the Environmental Protection Agency established

particulate matter and ozone monitoring stations near the east entrance of Pinnacles National Monument in 1987, which have been running continuously since that time. Additionally, as part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) network, visibility in the monument has been monitored using an aerosol sampler (1998-present), a transmissometer (1988-1993) and an automatic 35mm camera (1986-1995). An analysis of 1989-2008 data from the monument indicates that visibility in the area is improving on both the clearest days and the haziest days (NPS 2010). The monument also has an official weather station located at the base of Condor Gulch. This station has provided long-term data, but the spatial variation in weather and climate has not been researched. Due to the limited instrumentation and lack of historical climate data, the monument lacks a detailed portrait of local microclimates.

SOURCES OF AIR POLLUTANTS

The principal air pollutants of concern for Pinnacles are ozone precursors, including nitrates (NO_x), reactive organic gases, (ROG) and particulate matter (PM). Sulfur dioxide (SO₂) emissions are not high. The major point sources of emissions (those that emit at least 100 tons/year of ROG, NO_x, particulate matter less than ten microns in diameter (PM₁₀), or SO₂) in the region are located near communities that are not adjacent to Pinnacles, e.g. energy facilities in San Ardo and Moss Landing. Within Monterey and San Benito counties, non-point sources of pollution, mostly mobile sources, are the greatest (California Air Resources Board 1998b).

The rate of urban and suburban growth in the Pinnacles region may lead to a substantial increase in pollution during the coming years. San Benito County's population is projected to nearly double, with a 94.1% increase by 2030, about twice as much as the average growth across California over the same 30 year period. Monterey County is projected to increase 31.7% between 2000 and 2030 (U.S. Census 2007).

Within Pinnacles National Monument there are a variety of known sources of air pollutants, including petroleum fuel vehicles used for most of the monument's small fleet of transportation vehicles and heavy machinery. These vehicles contribute an unidentified portion of the local air pollutants. The monument also operates 2 hybrid electric highway vehicles, 3 golf cart type Neighborhood Electric Vehicles (NEV), and 3 truck NEVs. Prescribed fires cause periodic emissions that roughly replicate a natural pollution source and are seasonally timed based on permission from the California Air Resources Board. Campground fires, visitor automobiles, and park commuter traffic often represent the most significant pollution sources within

the monument. Finally, furnaces providing heat to monument residences, offices, and shops are regular, though relatively minor sources of air pollutants.

Programs at the monument also work to minimize pollution sources. These include operation of a shuttle service that reduces the number of personal vehicles driving from the campground to the main trailheads in Bear Gulch. The monument installed solar panels at the East Pinnacles Visitor Center. While this effort does not directly reduce pollution inside the monument, it is an example of the monument's growing commitment to sustainability.

Climate and Weather

The climate of Pinnacles is typical of the Mediterranean climate of California, with cool wet winters and hot dry summers. Summer temperatures of over 100°F are common, but coastal fog will often come into the valleys at night. Nighttime summer temperatures of 50°F are common, making for enormous daily temperature swings.

Winter climate is similar to the California deserts, with mild days and nights often dropping into the low 20s. The average precipitation is approximately 16 inches per year. Nearly all of the precipitation is in the form of rainfall, with the majority occurring from December to March. Snowfall is rare, but does occur in significant amounts about every 10 years.

The great variability in seasonal precipitation is due to the east Pacific high. This dominant weather feature shifts northward in the summer to shunt storms far to the north. Occasionally this feature brings subtropical moisture into central California from southerly latitudes, producing one to five thundershowers per year in the monument. Mostly, however, the east Pacific high acts as a giant valve completely shutting off precipitation for long stretches of the year.

California is known for its long dry and wet cycles. Changes in the East Pacific high shift on approximately a six-year cycle. The result is persistent drought for five to eight years, followed by a wet period. Such cyclic variation is an important consideration in vegetation, wildlife, and water management.

Climate Change

Climate change models have been developed to project future alterations to temperature and precipitation regimes in the State of California (Hayhoe et al. 2004, Cayan et al. 2008). While modeled changes in climatic variables can vary substantially based on differing emission scenarios, all current models predict

significant warming during the 21st Century. Already, increased temperatures, presumably due to anthropogenic influence, have been documented state-wide and impacts from climate change are already occurring; however, changes in climate are anticipated to be more rapid and severe in the future (CEC 2009).

In the last fifty to eighty years, the climate in California has become warmer. This increase in temperature has been documented using multiple sources of historic data. For example, heat waves have become more humid and warmer primarily as a result of higher night-time temperatures (Gershunov and Cayan 2009). Regional mean March temperatures have increased 1.8 degrees F every decade since 1948, resulting in earlier melting of the snow pack in the Sierra Nevada and, likely, a positive feedback related to albedo effects (Kapnick and Hall 2009). Overall, California has experienced a warmer late-winter/early-spring as measured by mean and maximum daily temperatures (Bonfils and Duffy 2007). Specifically within the climatic region where Pinnacles is situated, annual minimum temperatures have increased by 3.7 degrees F per decade since the 1920s (Pittiglio et al. 2008).

Unfortunately, climate models predict even greater increases in temperature for the future of California. By the end of the 21st Century, global climate models have simulated an increase in mean annual temperature between 2.7 and 8.1 degrees F, depending on the emission scenario utilized (Cayan et al. 2008). An earlier study modeled a 4.1 to 10.4 degree F increase in mean annual temperature by the end of this century (Hayhoe et al 2004). Because of the inherent variability in precipitation that is associated with California's Mediterranean-like climate (Michaelsen et al. 1987), future changes to the precipitation regime and confidence in modeled predictions are relatively low compared to those generated for temperature change. Future precipitation simulations developed by Cayan et al. (2008) and Hayhoe et al. (2004) did not reveal any strong trends towards increasing or decreasing mean annual precipitation in the central portion of the state, although Hayhoe et al. (2004) did predict a decrease in precipitation for southern California. However, both of these studies suggest that overall, future precipitation may possibly occur more often in association with severe storms events. Thus, rainfall amounts in the climatic zone where Pinnacles is located may or may not change over the long-term but rainfall will likely occur in less frequent but more intense storms.

FLORA

The vegetation that occurs in Pinnacles National Monument is typical of other locales throughout the interior South Coast Range, which runs north to south along the central coast of California. The

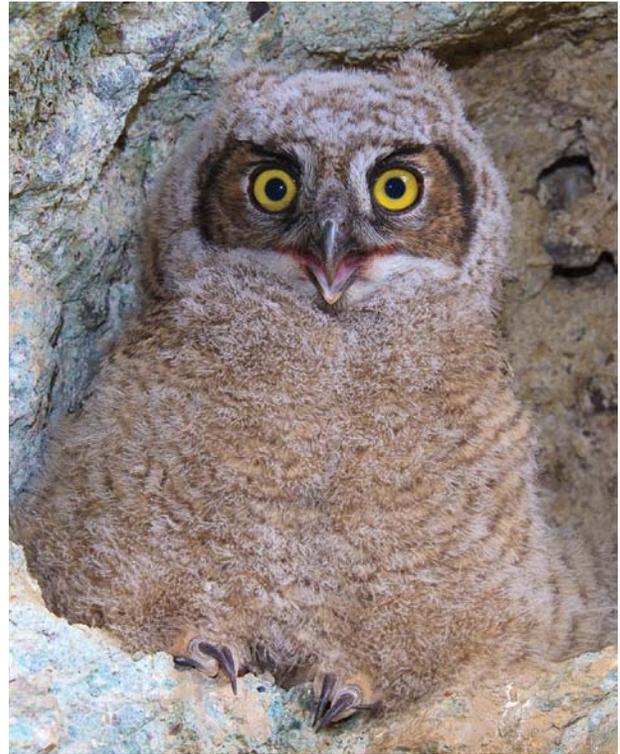
chaparral vegetation type that dominates the landscape in addition to the other upland plant communities found in Pinnacles are composed of species highly adapted to long, rain-free periods that coincide with summer drought. Because the climate in this part of California is highly variable (Michaelson et al. 1987), many of the plant species are resilient and/or resistant to stress caused by low water availability. However, any long-term change in climate will undoubtedly have a profound influence on the vegetation types found here.

Based on paleobotanic records, it is believed that increases in just 1 degree C or 1.8 degrees F have dramatically altered the geographic distribution of plant species and the vegetation types they form throughout many portions of California (Axelrod 1981). Because climate change models predict increases much greater than 1.8 degrees F, it is likely that plant species and vegetation types will change dramatically in the future. For example, Loarie et al. (2008) predicts that out of the 2,387 endemic plant taxa found in California, 66% will experience a greater than 80% decrease in their distribution across the landscape. Based on the historic and ongoing increases in temperature recorded in California, evidence of response to climate change has already been documented as chaparral, woodland and other vegetation types have experienced massive die-offs of dominant species and/or have shifted upward in elevation (Paddock 2006, Kelly and Goulden 2008). Plant taxa with shallow root systems, like *Arctostaphylos glauca* (Hellmers et al. 1955), which occurs in the chaparral of Pinnacles, may be the first to experience stem die-back or mortality, similar to what has occurred in warmer locales in southern California (R. Steers, University of California, Riverside, unpublished data). Wetland or riparian plant species may also be especially vulnerable if rainfall patterns shift towards more intense, pulse-like events since this will likely result in more surface run-off and less infiltration to recharge local groundwater that feeds creeks into the dry season.

FAUNA

As with flora, different animal species in California have been and will continue to respond to climate change. Resampling of historic datasets in both the Sierra Nevada and the Peninsular Range have shown strong shifts in animal species distributions related to increased warming over the last century (Moritz et al. 2008, Hargrove 2010). In other parts of the state with relatively low elevation relief, like the Coast Ranges, use of climate change models predict that the optimal bioclimatic envelopes of many bird species will alter considerably in the future (Wiens et al. 2009). Within Pinnacles and its surroundings, climate change will have direct and indirect effects on wildlife. For some species, the future climate may be within

Great horned owl nestling. Photo by Gavin Emmons © 2011.



their physiological tolerance; however, if the vegetation or associated animal species they rely on are no longer able to persist, they will be negatively impacted. Because Pinnacles lacks high relief and corresponding biotic zonation along an elevational gradient, its wildlife will not be able to find climatic refuge by moving upslope. Rather, it may be the relatively cool and moist canyon bottoms of Pinnacles that end up providing the greatest value as a harbor against the changing climate, although the importance or ability of these relatively mesic areas to aid in the persistence of species is unknown.

ECOSYSTEM PROCESSES

Climate change is expected to alter ecosystem processes, like fire regimes, hydrologic cycles, and biogeochemical cycles, among others. Specifically, the fire regime has the potential to be dramatically altered by climate change and may have the largest influence on monument resources. The fire regime of an area can be characterized by its frequency, intensity, extent, type, and seasonality (Brooks et al. 2004). Under a warmer climate, it is expected that any of these properties could be altered. For example, vegetation will be drier and more readily flammable, which will extend the fire season earlier in the spring and/or later into the fall compared to current norms (Westerling et al. 2006). In mid-November of 2008, unusually late wildfires, such as

the “Montecito Tea,” “Freeway Complex,” and “Sayre” fires, ravaged areas of southern California. Similar late-season fires are possible at Pinnacles, providing dry conditions and ignition sources. It is also possible that in dry years large wildfires could occur throughout the winter and spring during what is normally the wet season. Individual plant and animal species, and the communities they form are all adapted to a particular fire regime and changing any of its properties will result in major consequences to monument resources.

Invasive species that displace native plants and wildlife may also benefit from climate change. For example, if increased aridity results in a more open shrub canopy through stem die-back or plant mortality, or if higher fire frequency precludes the ability of shrublands to recover, then exotic annual grasses and forbs will likely colonize openings in shrub and woodland canopies and further prevent or slow recovery. Climate change has the ability to transform several important aspects of invasive species, such as how they are transported, the types and numbers of new invasive species, altered impacts from existing invasives, altered distribution of existing invasives, and altered responses to control methods (Hellman et al. 2008). Currently, invasive species are a major threat to Pinnacles ecosystems and it is still unclear how climate change will influence the interaction between the numerous invasive and native species in this monument.

Other processes and properties of ecosystems will also be influenced by climate change. At Pinnacles, it is possible that pathogens may benefit as physiologically stressed plants may become increasingly susceptible to pests. Increasing aridity may also slow the rate of biogeochemical cycling for certain elements, which can have feedback on plant growth and even fire risk. Furthermore, increased fire frequency will likely alter mineralization rates and change soil conditions, likely to the detriment of native plants (Ehrenfeld 2003). If precipitation does occur in less frequent but more intense storms, then not only will biogeochemical cycling become more pulse-driven, like in desert ecosystems (Schwinning and Ehleringer 2001), but the danger of mass-wasting may become much greater. For example, with more frequent wildfires, bare soils on steep hillslopes will occur more often, thus, infrequent but severe downpours versus more frequent, less intense storms could result in greater hill-side erosion and sedimentation rates in stream beds and canyons. Another set of processes related to the human footprint can also impact plants and animals under a changing climate. As biota respond to climate change, roads, dams, and other infrastructure that have fragmented habitat or removed corridors will likely hamper their ability to persist (Ewers and Didman 2006).

CULTURAL RESOURCES

Climate change may have negative and positive effects on cultural resources. A more arid climate may result in conditions that are less corrosive or degrading to archaeological artifacts found in natural settings. In contrast, increased fire frequency plus higher rates of erosion from large storm events may result in more damage or loss of artifacts, depending on their setting. Other important cultural resources are the plants and animals utilized by indigenous people groups of the monument. Current efforts to reengage these groups in the management of culturally significant deergrass (*Muhlenbergia rigens*) and white-root sedge (*Carex barbarae*) populations may no longer be possible if future climatic conditions limit the ability of these species to persist in the monument, although other culturally significant species such as chia (*Salvia columbriana*) may persist.

VISITOR EXPERIENCE

Overall increases in temperatures and increases in the incidents of heat waves may result in higher medical emergencies in the monument as visitors become fatigued or succumb to heat-related illnesses more often. Greater fire frequency and severity could result in the loss of life, the closure of trails and parking areas, the displacement of attractive wildflowers with weedy species, and an overall degradation of the aesthetic qualities of the monument. Depending on the severity of climate change and its associated alterations to ecosystem processes, and the flora and fauna, visitor experiences may be greatly altered.

Viewsheds

Geologic formations and panoramic views of the surrounding landscape are expansive, high quality, undeveloped viewsheds within Pinnacles National Monument. The viewsheds are also important natural, cultural, and scenic resources, and the preservation of these resources is important for public enjoyment.

The views offered at Pinnacles include both natural and cultural resources within the monument and beyond the monument, including the San Andreas Fault, the Diablo Range, Monterey Bay and the Ventana Wilderness. Along the Hwy 146 east entrance, one can see the historic resources such as the Butterfield homestead area. These historic views contribute to the regional significance of the monument. Since acquisition of the former Pinnacles Ranch property, the monument has been actively removing invasive yellow star thistle from the historic landscape. Expansive views of the geologic features and surrounding region’s rural character can be seen from high elevation areas such as the High Peaks and North Chalone Peak trail.

The developed infrastructure of the monument (roads, trails, buildings, and utilities) generally blends in well with the landscape. Exceptions include some roads, trails, and the paved parking lot at Chaparral which can be viewed from the High Peaks. Facilities for research protection such as fencing could also be seen from some trails. Some development from the surrounding communities can be seen from high elevation trail areas. Haze, dust, and air pollution sources from outside the monument also affect viewsheds.

Pinnacles has two designated integral vistas. “Integral vistas” are views from inside a mandatory Class I airshed area looking outward to specific important panoramas or landmarks beyond the class I area’s boundaries, where views have scenic, scientific, or cultural importance to the class I area. Each national park unit with Class I air quality has completed the identification of integral vistas. The two integral vistas from the monument are the High Peaks and the North Chalone Peak Trail. The High Peaks vista is integral to the visitor experience and has scientific value. The High Peaks area includes the most popular trails for visitors which provide views in all directions. The scientific value of this vista is associated with the geologic story of the monument. The view to the northeast includes a portion of the San Andreas Fault. Along this fault, views of large sandstone formations, broken off from the continental plate and dragged northward by the Pacific plate, illustrating tectonic plate activity. The North Chalone Peak Trail vista was also noted as integral to the visitor experience and is important for its scenic and historical values. Views to the west include the Salinas Valley and further west into the Los Padres National Forest and the Ventana Wilderness area. At North Chalone Peak, which includes the historic fire lookout, 360 degree views are possible with views of geologic formations, and on some days, the Monterey Bay of the Pacific Ocean is viewable.

Night Sky

The dark sky over Pinnacles National Monument has been identified as an asset, contributing to the monument’s pristine landscape. Preserving this critical resource is important for the protection of nocturnal habitat and for the enjoyment of the public.

The night sky at Pinnacles is among the best in the greater San Francisco Bay Area, primarily due to the rural nature of the area (low population density, few organized communities) as well as being in a Class I airshed.

Population growth and the subsequent artificial lighting of nearby communities have degraded the view of the night sky. Although light trespass from towns



The moon sets over Pinnacles, competing with light pollution from Soledad Prison. Photo by Paul G. Johnson.

such as Hollister, Soledad, Greenfield, King City, and Salinas, as well as the Soledad Prison, are visible to the naked eye, research by the NPS Night Sky Team shows trespass from San Jose, Bakersfield, Visalia, Fresno, and even Los Angeles. Among the unaided views identified by the team include views of the Milky Way (with some definition), thousands of stars (some to high magnitudes), and star clusters. With magnification, galaxies can still be seen on a clear night in the monument.

There are currently no lighting ordinances to preserve the night sky in surrounding communities. Though much of the area surrounding the monument is still rural, development is occurring. It is likely that further growth will lead to the degradation of dark sky if night sky protection ordinances are not adopted by surrounding communities.

Natural Sounds

The acoustic environment is a combination of all the physical sound resources within a given area. Acoustic resources include both natural sounds and cultural and historic sounds. The soundscape can be defined as the human perception of those physical sound resources. Because the NPS works to protect and enhance both monument resources and visitor experiences, Pinnacles differentiates between physical sound sources and human perceptions of those sounds. The acoustic environment varies in its character from day to night and from season to season and can be affected by changes in numbers of visitors who introduce human-caused sound into the environment. Pinnacles National Monument is generally a quiet landscape, with occasional short-term interruptions of the natural sounds of nature and quiet. Natural sounds heard in the monument include wind, water, wildlife, and vegetation. The monument does not have baseline acoustic data. Visitor use studies, however, have indicated that 72% of visitors consider natural quiet/sounds of nature to be extremely important. The presence of unwanted, uncharacteristic, or inappropriate sounds can interfere with or alter the acoustic resource and degrade the visitors' experience. Visitors have noted while on the trails (within wilderness), that large groups of hikers and climbers can be noisy. Loud vehicle noises from motorcycles or trucks backing up can be heard from high points in the monument.

Noise is defined by the NPS as human-caused sound that is undesired or extraneous to an environment. Depending on the atmospheric conditions, the closeness to a noise source, and topographic features, visitors generally experience very little noise while in designated wilderness. Several sources of noise can, however, mask natural sounds in wilderness. The sounds and sights of overhead aircraft can greatly diminish people's sense of naturalness and solitude. There are no Air Force installations with designated airspace or municipal airports and there are currently no commercial air tours near Pinnacles. The sound of passing vehicles on Highway 25 can be heard from the bottomlands and adjacent canyons, including portions of the Ben Bacon Historic District. During several months of the year, vineyards use propane cannons to deter birds from feeding on grapes. These cannons produce a loud "bang" approximately twice per minute. Currently they can be heard on the extreme east side of the monument (portions of the Ben Bacon Historic District) and for the uppermost mile of the North Chalone Peak Trail and all of the South Chalone Peak Trail.

The acoustical environment is vital to the natural functioning of park ecosystems. The natural

sounds within Pinnacles National Monument are an important resource and a critical component of ecological communities within and outside of the monument. Understanding the role of natural sounds in a healthy ecosystem is critical to their effective management and protection. Studies elsewhere in the national park system, and other sensitive environments, suggest that the acoustic environment is important for intra-species communication, territory establishment, including finding desirable habitat, courtship and mating, nurturing and protecting young, predation and predator avoidance, and effective use of habitat. Visitors also appreciate natural sounds. Many natural sounds such as gurgling streams, bird songs, or the rustling of leaves on a fall day can have a calming and relaxing effect. Sound-sensitive resources or values may include biological resources, special areas such as wilderness, cultural and historic resources, and visitor experience. Approximately 16,000 acres (over 60%) of the monument is congressionally designated wilderness.

California condors, as well as bats and breeding and nesting raptors, may be sensitive to noise disturbance. Wildlife sensitivity to sounds is examined through research in **acoustic ecology**, the study of sound in the relationships between organisms and their environment. Scientists also use **bio-acoustics** to determine the health of natural habitats. Scientists can discern details about animal populations and behavior by recording sounds in the wild. Such bio-acoustical recordings are used in a variety of ways, including bird censuses and bat echolocation studies.

The natural sounds of Pinnacles National Monument are valuable resources that can easily be degraded or destroyed by inappropriate sounds or loud sound levels. As a result, the monument's acoustical environment requires careful management if it is to remain unimpaired for future generations.

Topography

The topography of Pinnacles National Monument ranges from rolling hills to rock spires, crags and other points of sharp relief. Although the terrain is mountainous with locally steep topography, the area is of generally low elevation ranging from less than 1,000 feet (300 m) along South Chalone Creek to 3,267 feet (996 m) at the summit of North Chalone Peak. Hawkins Peak, which is composed largely of "the pinnacles," is over 2,600 feet (792 m) in elevation. The mean elevation of the monument is about 2,000 feet (610 m) above sea level. Floodplains and terraces are less developed inside the monument; beyond these there is little level ground for development. With the addition of the Pinnacles Ranch in 2006, the monument acquired

bottomlands that had been used for dryland farming and/or livestock grazing, and as an airstrip.

Geological Resources

The volcanic formations in Pinnacles National Monument are regionally exceptional, set within an area of granitic, metamorphic, and sedimentary rocks of the Gabilan Mountains, part of California's central Coast Ranges.

VOLCANIC SPIRES

Pinnacles National Monument derives its name from rock spires and crags that are remnants of part of an early Miocene or late Oligocene (about 23-24 million year old) volcano. These outstanding landscape characteristics, the "Pinnacle Rocks," inspired the first conservation movement in the area and eventually led to Theodore Roosevelt's declaration protecting Pinnacles National Monument in 1908. The Pinnacles themselves are weathered rocks of the Pinnacles-Neenach volcanic field in an advanced stage of decomposition. The volcanic center originated when rhyolite and dacite magma was forced to the surface through fissures in a basement of granitic and metamorphic rocks. Later volcanic activity built up a thick pile of

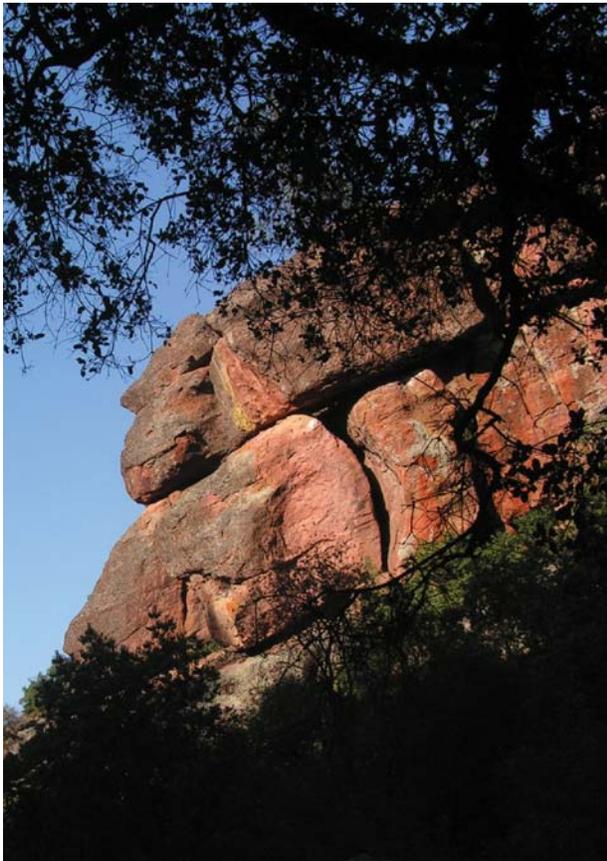
pyroclastic and flow units above the earlier lavas. The western portion of the volcanic field was eventually torn by the San Andreas Fault from its origin approximately 195 miles south (near Lancaster, California). Over millions of years as it moved northward to its present position in the monument, the volcanic layers were cut by smaller faults, bent and tilted, covered with sand in a shallow marine environment, and eventually uplifted and exposed. Slowly, the erosive work of water and wind on the rhyolitic tuff and other pyroclastics gave rise to the exceptional geologic forms and highly variable topography for which Pinnacles is famous. These spires are significant for their scenic values; present an outstanding example of plate tectonics; and provide important habitat, particularly for nesting California condors and raptors such as prairie falcons.

CAVES

Erosion of the Pinnacles has produced talus cave formations unlike most limestone caves or lava tube caves on the North American continent. Large boulders break from spires and tumble into steep gorges, forming talus jumbles on a grand scale. Caves occur where the largest interstitial spaces in these heaps of variable sized boulders remain relatively insulated from daily temperature extremes. The largest and most persistent caves have formed in places where huge boulders cap a section of narrow canyon. Intermittent stream erosion beneath the boulder ceiling keeps the cave floor open. The 525-foot long Balconies Cave is an example of this type of geologic formation. The most outstanding cave in the monument, the 1700-foot long Bear Gulch Cave, also originated in this fashion when volcanic tuff boulders capped a gorge.

Unlike most lava tube or limestone cave systems, the talus caves of Pinnacles National Monument have multiple entrances and therefore greater air exchange. The darkness and reduced air flow of the monument's talus caves, however does form moderately stable microclimates in an area with widely varying temperatures. The caves are relatively cool and moist during hot and dry summer days, but also can be relatively warmer and drier during cold and rainy winter days. Because of their moderate microclimates, the caves provide important habitat for bats, amphibians, invertebrates, and other wildlife. Bear Gulch Cave is unique because it is used by Townsend's big-eared bats for both overwintering and as a maternity colony - one of the largest such colonies in California. Listed as a "species of special concern" by the state of California, monument staff regulate visitation to prevent impacts to breeding or hibernating bats. Federally threatened California red-legged frogs also use Bear Gulch Cave during much of the year, though they are not known to breed there.

A view from the Bear Gulch Trail. NPS photo.



By providing a window into the geologic processes that shape the monument, the caves are also important to monument visitors. The Bear Gulch and Balconies Caves are some of the most accessible talus caves in the United States, and the Bear Gulch Cave may be the longest. Wildlife and people visit the caves in the summer to escape the sun and heat.

ROCKS AND MINERALS

Because of its long and complex geologic history, Pinnacles National Monument harbors a diverse group of rocks and minerals. The Pinnacles themselves are primarily comprised of tuff, breccia, and volcanic ash of rhyolite, dacite, and andesite. Layers of contrasting texture or color are readily visible in several areas. Because of the explosive eruptions that formed the breccias, fragments of a diverse group of older rocks are also embedded within these volcanic rocks. The heat and compression of volcanic deposition also metamorphosed some inclusions. Among the rocks and minerals captured or formed in the strata are: feldspars, pumice, and natural glass. Calcite deposits are also found within fractures of the volcanic rocks. While most of the rock visible in the monument is volcanic, granitic outcrops are prevalent in western and southeastern portions of the monument. These rocks were formed by slow cooling of magma deep in the Earth's crust, and include: quartz monzonite, quartz diorite, granodiorite, and gneiss. The oldest rocks in the monument are late Paleozoic Gabilan limestone, a metamorphosed, white coarse-grained marble with some quartzites and schist, found in thin, isolated bodies within the granitic rocks on the west side of the monument. These rocks represent the preexisting crust into which the granitic bodies were intruded. The youngest rocks in the monument are the relatively unconsolidated sandstone and shale that form crumbling cliffs and rolling hills in eastern portions of the monument. Fragments of all of these rocks occur in alluvium within the monument. The well-preserved sequence of volcanic rocks present at Pinnacles National Monument has been an invaluable resource to geologists investigating the history of the San Andreas Fault and the development of the plate margin. Together the rocks tell a story of hundreds of millions of years of the Earth's history.

FAULTS

As noted earlier, the monument is located within the Pacific-North American Plate boundary zone, an area of major tectonic activity. The movement of the Earth's plates forms major faults - geologic fractures where masses of rock and earth slip past one another, within the boundary zones. Three significant faults occur within the monument: Chalone Creek, Pinnacles, and Miner's Gulch. The Chalone Creek

Fault is believed to have been the ancestral main line of the San Andreas Fault, which is now located about a mile east of the monument's Highway 25 boundary. The same forces that drive the faults have deformed and tilted the layers to help form the distinctive landforms within the monument.

Hydrologic Resources

Because Pinnacles National Monument is situated in an arid, chaparral-dominated mountain range, its limited water resources are of particular value to biodiversity and visitors.

CREEKS

The terrain in the Gabilan Range is rugged and deeply dissected. The drainage pattern is predominately controlled by fault traces and fractures at intersecting angles. Many streambeds in the monument are ephemeral or intermittent, dry except after significant rain. The longest of these intermittent creeks within the monument are the West Fork of Chalone Creek and Frog Creek. A limited amount of surface water can be found in these streams during the dry season. The Chalone Creek main stem, Bear Gulch Creek, Sandy Creek, and an unnamed stream in McCabe Canyon have stretches of perennial flow, although it may be very low or stagnant during summer months. Much of the perennial water in these creeks is found in small, sheltered plunge pools. All of the creeks named above converge within the monument, flowing into Chalone Creek, the predominant drainage of the southern Gabilan Range. Originating approximately 4 miles west of the NPS boundaries, Chalone Creek flows the length of the monument from the northwest to the southeast corners. Approximately 70% of the Chalone Creek drainage above its confluence with Sandy Creek lies within Pinnacles National Monument, while about 40% of the Sandy Creek subwatershed lies within the monument. Nearly all of Pinnacles' 41.4 square miles drains into this tributary, which empties to the southwest into the Salinas River, which in turn flows northwest into Monterey Bay in the Pacific Ocean.

Streams within Frog Canyon and McCabe Canyon lie entirely within the monument. Flowing off South Chalone Peak, there are a series of smaller ephemeral drainages entirely or nearly entirely within the monument that empty into Chalone Creek at or near the monument's southern boundary. Most streams within the monument, however, have major segments on private lands. The headwaters of Bear Gulch Creek and the main stem of Chalone Creek and many of its tributaries originate outside the monument boundary. Also, most of Sandy Creek is located outside of the monument. Many creeks in the area have been altered

along some portion of their length. Chalone Creek and Sandy Creek are free-flowing throughout their course in the monument, but their uppermost reaches, on private lands, are impounded by small stock ponds. Bear Gulch Creek is impounded behind a dam within the monument built during the CCC era (1933-1942).

Periodically, heavy rains cause substantial flooding within the monument. There have been three large floods in the Chalone Creek watershed during the past two decades, including an event in 1998 that has been estimated to have been in the range of a 40-year flood. These floods have caused millions of dollars in damage to monument facilities. Some stream reaches within the Chalone Creek watershed experienced considerable erosion, whereas others experienced substantial sedimentation. The narrow canyons provide little space for development. Therefore, facilities are often located relatively close to stream channels.

SEEPS AND SPRINGS

Nine springs, including Superintendent's Spring, Chalone Bridge Spring, and Oak Tree Spring, were known and marked within the monument prior to the 2000 and 2006 monument boundary expansions. Recently acquired lands have not been fully inventoried for hydrologic resources, but it is known that a minimum of five spring-fed wetlands occur in McCabe Canyon and the Bottomlands. Small seeps may also appear seasonally in wetter years. Springs, such as Willow Springs, generally occur along fault lines, along rock fractures, or along lithologic contacts (between different types of rocks). Within the monument, springs are no longer used as domestic water supplies for facilities due to their inadequate water production. Within the chaparral dominated landscape, the wetlands associated with these springs act like oases during hot and dry summer and autumn months. In addition to supporting a high diversity of plants, these wetlands provide important forage, resting, or rearing habitat for Neotropical migrant birds, amphibians, butterflies, and other wildlife that move through the monument.

ARTIFICIAL RESERVOIRS

Bear Gulch Creek is impounded behind a dam within the monument built during the CCC era. Due to low input during the dry season, the 2.7-acre Bear Gulch Reservoir is stagnant for much of the summer and is subject to eutrophication. The reservoir is no longer being used for domestic purposes, although it is now important habitat for threatened California red-legged frogs. Because this frog has been eliminated from over 70% of its historic range and most natural habitat has been significantly altered, such artificial habitats are valuable to maintenance of the regional population

as a result the monument has elected to preserve this important historic and natural resource. Small (about 1 acre or smaller) earthen dam stock ponds on the east of the bottomlands (former ranchlands) are currently being reviewed for their habitat and cultural values to determine what management actions (if any) should be taken.

SUBTERRANEAN WATER

Groundwater exists within the monument primarily in the valley-fill alluvium. This alluvium may reach a depth of at least 38 feet (12 m) and therefore may serve as a substantial groundwater reservoir. The alluvium is more permeable than the surrounding bedrock and of high hydrologic conductivity. Where the valley crosses a resistant rock unit, this groundwater is often brought to the surface in perennial pools.

The diversity of geology strongly affects ground water. Three geohydrologic units are present: 1) granitic and metamorphic rocks, 2) volcanic rocks — the Pinnacles Formation, 3) and porous sedimentary rocks, which include the Temblor Formation and the valley-fill alluvium. Most of the monument is underlain with volcanic rocks. Surrounding the central area of volcanics are granitic rocks on the western and southeastern sides, and sedimentary rocks of the northeast side. Three northward trending faults that traverse the monument have produced structural traps for groundwater. The valley alluvium, particularly along the east entrance road and South Chalone Creek, is a reliable source of groundwater. One well produces over 10 gallons per minute. The Temblor Formation is less well studied, but is another potential water source.

WATER USE

Three wells drawing water from depths of 90 to 300 feet supply all of the monument's drinking water. The Bear Gulch, Chalone, and Peaks View facilities are serviced by a well that taps the valley alluvium near the Bear Creek – Chalone Creek confluence. The west side is serviced by wells. Another well on the former Kingman Ranch supplies water to the campground and Bottomlands facilities. Public water supplies are treated regularly to guard against public health threats. Additional wells exist in the monument, but do not provide public (potable) drinking water. Total water use from all wells in 2006 was 3,101,614 gallons. No comprehensive study has been made of total private and federal water consumption in the watershed and the effects of use on long-term aquifer sustainability. The NPS Water Resources Division plans a Watershed Conditions Assessment for Pinnacles National Monument in the coming years.

WATER QUALITY

In 2006, the USGS completed a baseline study of water quality in seven springs within the monument. The resulting data indicate that spring water in the monument is of generally good quality. Water samples were analyzed for dissolved concentrations of major ions, trace elements, nutrients, stable isotopes of hydrogen and oxygen, and tritium. In most cases, the concentrations of measured water-quality constituents in spring samples were lower than California threshold standards for drinking water and federal threshold standards for drinking water and aquatic life. However, three of the springs had dissolved arsenic concentrations that were higher than the 2006 EPA drinking water standard of 10 g/L. It is noteworthy that effluent from the residence area at Chalone Creek picnic area discharges to a leach field buried in the porous alluvium near the stream. While no indication of surface or groundwater contamination has been found, it may warrant further monitoring.

The San Francisco Bay Area Inventory and Monitoring program initiated surface water quality sampling in 2006. The sites are in Sandy Creek (3), McCabe Canyon (1), Bear Gulch (1), and Chalone Creek (3). Insufficient data has been gathered for analysis, but the specific conductance values of initial samples for Chalone Creek ranged from 300-600 S/cm, while Sandy Creek was a bit higher and Bear Creek and McCabe Canyon Creek were a bit lower. Samples taken during the 1990s from surface waters also illustrated that Chalone Creek is very well buffered, with specific conductance values in excess of 200 S/cm. Calcium concentrations are higher than 1,000 eq/L. The data also suggests that surface waters in Pinnacles are not sensitive to potential acidification from SO_4^{-2} and/or NO_x deposition levels that could reasonably occur in the foreseeable future. To date, no major pollution concerns in Pinnacles' surface waters have been identified.

In 2000, the monument evaluated stream macroinvertebrate monitoring as a means to assess water quality and stream health. The results lacked many species typically used as indicators of good water quality, but these are species most likely to be found in cool, perennial streams. Therefore, because the stream systems at Pinnacles are relatively warm and primarily intermittent, the species assemblage should not be considered a sign of poor water quality. Instead, the degree of diversity documented is an indication that the Pinnacles aquatic ecosystem is fairly healthy (Robert Wisseman, Aquatic Biology Associates, pers. comm.).

The presence of feral pigs in recently acquired (2000-2006) lands in the eastern portion of the monument has raised water quality concerns, especially at the

campground where pigs are known to wallow in springs and frequent Sandy Creek. These are areas that monument visitors also explore. Due in part to the likelihood that pigs contribute to fecal contamination of these waters, the monument has excluded feral pigs from the lowlands of Bear Valley via a newly erected pig exclusionary fence. Septic systems in the campground and McCabe Canyon residence are also being investigated as sources of surface water contamination.

FLOODS AND FLOODPLAINS

FEMA Flood Insurance Rate Maps have been produced for Sandy Creek in this area (San Benito County, California, map numbers 06069C0675D and 06069C0500D), however, the analysis conducted was general and no site specific flood elevations were reported. The maps generally depict the 100-year flood inundating large areas of the adjoining floodplain along the length of the Sandy Creek drainage, but again, the floodplain boundaries do not appear to be tied to any recoverable elevations. The map opposite shows the Sandy Creek floodplain analysis.

In 1995 the USGS conducted a detailed flood study for Pinnacles National Monument that included both Chalone and Sandy Creeks. This study produced a detailed report and a cross section based floodplain map (Meyer, R.W., 1995). In brief, the USGS study concluded that, "most of the buildings and proposed building sites in the monument area are above the 100-year flood." The USGS study utilized unit hydrograph techniques to estimate the magnitude of the 100-year flood and subsequently predicted flood depths at ten cross section locations on Sandy Creek using a standard step-backwater model. Additionally, relatively detailed floodplain maps for Chalone Creek and Bear Valley were produced using a 10-foot contour interval base map and are included in the report.

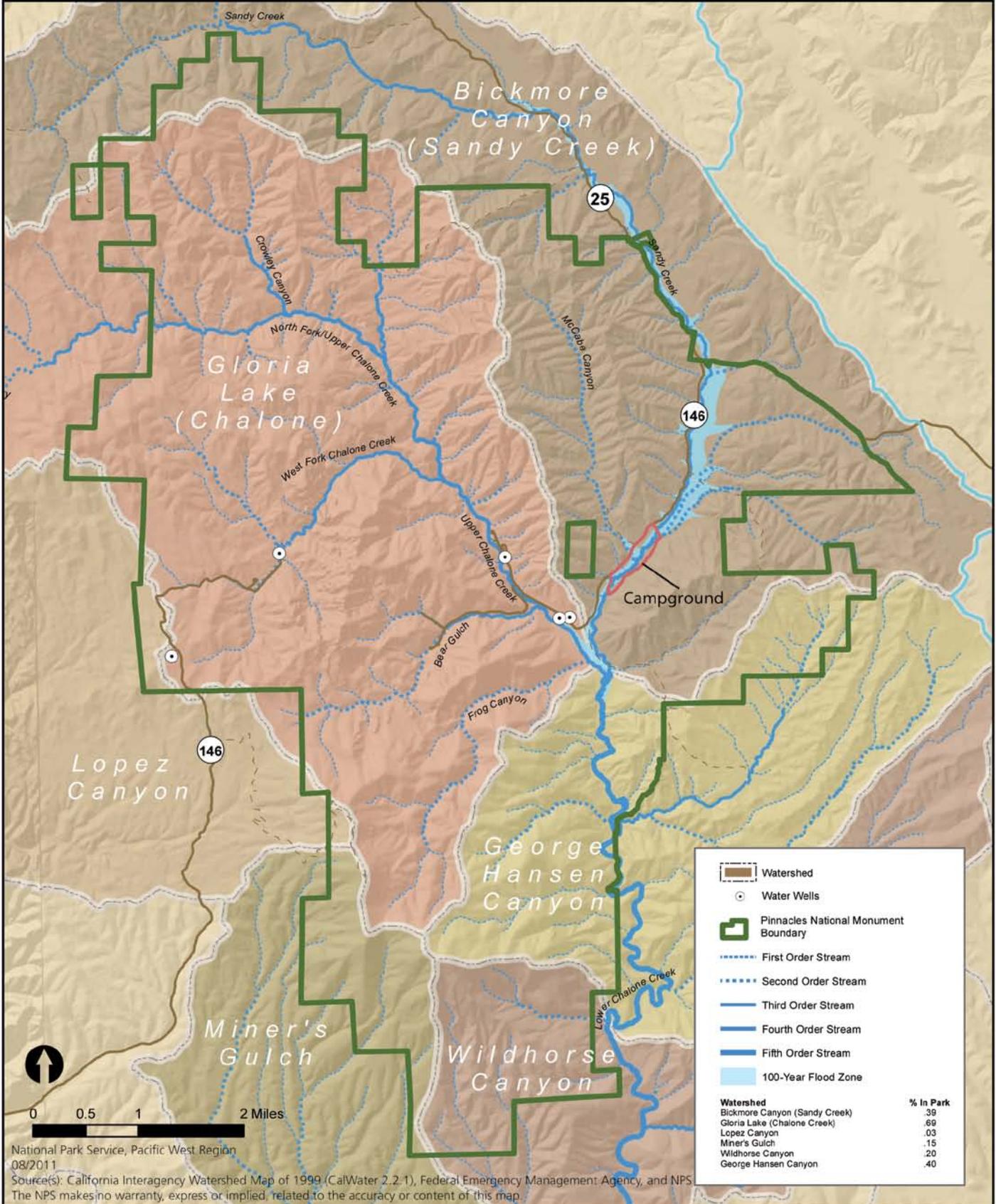
Based on the unit hydrograph technique, the USGS estimated the magnitude of the 100-year flood along Sandy Creek to be 3800 cubic feet per second (cfs). Results from the step-backwater analysis indicate that a flood of this magnitude will achieve a stage that varies between about four and nine feet above the thalweg of the channel between the confluence and the uppermost cross section, which is located immediately downstream of the campground store.

Unfortunately, the detailed analysis did not include the portion of Sandy Creek adjacent to the upper portion of the campground. However, the lower portion of the campground was included in the analysis, and due to the proximity of most of the sites in question, the results from the flood modeling may be reasonably extrapolated to the upstream sites. Furthermore,

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any future floodplain assessment along Sandy Creek (and Chalone Creek) may utilize flood stage estimates from the USGS study by comparing flood depths to adjacent overbank areas of interest. More specifically, if the difference between the bottom of the channel and the site of interest is substantially greater than nine feet (the maximum estimated stage from the model for Sandy Creek) then the site may be considered outside of the 100-year floodplain.

The USGS models produced a reasonable demarcation of areas of potential inundation, as is required by Executive Order 11988 (Floodplains and Wetlands). Flooding, however, has the potential to cause major changes in streambed morphology, thereby altering the corresponding inundation level. In-stream and near-stream structures have not been analyzed for their impact upon future flood dynamics or their impact upon channel morphology. Therefore, more detailed analysis is needed. Land use patterns outside the monument also have the potential to adversely affect channel morphology within the monument boundary. Baseline data such as soil infiltration rates, unit stream discharge, estimates of stream flow with corresponding rainfall totals, and simple channel surveys have not been collected.

WATER RIGHTS

No adjudications of water rights have been initiated by California within the vicinity of the monument. If water rights were to be adjudicated, monument water uses would need to be quantified, including consumptive needs of visitors and monument administration, and needs for water-dependent resources such as for federally threatened species, such as for California red-legged frog habitat, and for maintaining the hydrologic character of talus caves, which are integral to the monument's original proclamation designating it under the Antiquities Act. To fully assess the existence and nature of a federal reserved water right associated with the monument, an examination of laws creating it would be necessary. If needed to fulfill the purposes of the federal reservation, a federal reserved right may be either for consumptive purposes (e.g., involving diversion of water from the stream) or for non-consumptive purposes (e.g., involving instream uses of water). A federal reserved right would be limited to that amount needed to accomplish those purposes. While this water right ordinarily comes into existence upon the reservation of federal land for a specific purpose, its existence can be confirmed and its exact contours (i.e., purpose, amount, timing, and source) can be ascertained only through a formal court determination. Until such a determination is made, the existence and contours of a federal reserved right are a matter of estimation.

Due to the presence of a federally threatened species and the monument's characteristic talus caves, there is some concern for the effects of additional water use development on monument resources. Approximately one-quarter square mile of the Bear Gulch watershed is located outside the monument's western boundary. There are no water rights of record upstream of the monument in the Bear Gulch watershed. Water development adjacent to the monument is primarily limited to use for grazing and a few agricultural uses. Regarding Chalone Creek watershed, there are about 9 square miles of watershed located upstream from the monument's western boundary. There are also approximately 15 square miles of the Sandy Creek watershed beyond the monument's northern and eastern boundaries that are tributary to Chalone Creek within the monument. Cattle are grazed in these areas and most water development is limited to stock ponds and one vineyard just outside the monument boundary. Additional future water development is possible, but because of a lack of water available in the watershed, development is not as likely to occur. Overall, though the potential for upstream water development exists, the risk is not currently thought to be great. It is important for the monument to ascertain its water resource needs before development occurs, and to ensure support for those needs with the necessary water rights. This support can be achieved through implementation of a combination of federal and state law for both consumptive and non-consumptive uses.

Soils

The soils of Pinnacles National Monument highlands are typically shallow, gravelly, sandy loams. Soil nutrients and water holding capacity are low. Most of the monument's soil is derived from rhyolitic conglomerate and decomposed granite. Soil on hill slopes is very shallow with poor development. These soils generally support extremely drought tolerant chaparral vegetation. Soils at hill toeslopes and valley bottoms are deeper and exhibit greater soil development with marked organic matter accumulation (well-developed A horizon). These soils have more nutrients, higher water holding capacity, and greater rooting depth. As a result, toeslope and valley soils tend to support oak woodlands and grasslands. All soils in the monument are described as well-drained to excessively-drained. Poor water holding capacity and infiltration properties of the soils results in high runoff rates and erosion during periods of intense rainfall.

The soil at Pinnacles was divided into four soil series corresponding to differences in parent material (Isgrig 1969). These include Laniger series, Sheridan series, Sand alluvial land, and igneous rock land. Of the soils described, Laniger gravelly, sandy loams and Sheridan

TABLE 18: ACREAGE AND PROPORTIONAL EXTENT OF SOILS AT PINNACLES NATIONAL MONUMENT

Soil Name	Acres	%
Ordeal-Passion-Badlands association, 50 to 100 percent slopes	3,171	11.7
Knuckle-Burgundy-Argixerolls complex, 20 to 70 percent slopes	1,573	5.8
Chalone-Firstsister-Highpeaks complex, 50 to 70 percent slopes	1,207	4.5
Casino-Argixerolls complex, 50 to 70 percent slopes	436	1.6
Casino sandy clay loam, 20 to 35 percent slopes	114	0.4
Rock outcrop-Highpeaks-Burgundy complex, 35 to 100 percent slopes	1,498	5.5
Knuckle-Chalone-Burgundy complex, 35 to 70 percent slopes	149	0.5
Backdoor-Tuborcio complex, 20 to 70 percent slopes	3,768	13.9
Rimtrail sandy loam, 0 to 5 percent slopes	60	0.2
Elder-Oxyaquic Haploxerolls complex, 2 to 5 percent slopes	32	0.1
Ordeal-Tuborcio-Passion complex, 20 to 50 percent slopes	2,094	7.7
Tuborcio loam, 2 to 20 percent slopes	185	0.7
Elder gravelly sandy loam, 0 to 1 percent slopes	154	0.6
Still clay, 0 to 2 percent slopes	46	0.2
Elder coarse sandy loam, 1 to 3 percent slopes	69	0.3
Tuborcio sandy loam, 35 to 50 percent slopes	790	2.9
Teapot-Rock outcrop complex, 35 to 50 percent slopes	191	0.7
Argixerolls-Rock outcrop-Chalone complex, 35 to 50 percent slopes	623	2.3
Still-Riverwash complex, 0 to 2 percent slopes	98	0.4
Firstsister-Oxyaquic Haploxerolls-Rock outcrop complex, 0 to 50 percent slopes	21	0.1
Toags-Oxyaquic Haploxerolls-Riverwash complex, 0 to 2 percent slopes	254	0.9
Toags-Pinnacamp complex, 0 to 5 percent slopes	80	0.3
Toags gravelly coarse sand, 2 to 9 percent slopes	59	0.2
Toags-Riverwash complex, 0 to 9 percent slopes	109	0.4
Oxyaquic Haploxerolls, 0 to 1 percent slopes	20	0.1
Rock outcrop-Highpeaks-Chalone complex, 35 to 50 percent slopes	730	2.7
Highpeaks-Rock outcrop complex, 35 to 50 percent slopes	282	1.0
Ordeal-Longsfolly-Passion complex, 9 to 50 percent slopes	3,803	14.0
Badlands	59	0.2
Backdoor-Tuborcio complex, 35 to 50 percent slopes	2,143	7.9
Backdoor sandy loam, 9 to 20 percent slopes	163	0.6
Chalone-Knuckle-Rock outcrop complex, 35 to 50 percent slopes	651	2.4
Chalone-Knuckle-Firstsister complex, 50 to 70 percent slopes	1,716	6.3
Pinnacles coarse sandy loam, 5 to 30 percent slopes	175	0.6
Pinnacles stony sandy loam, 30 to 75 percent slopes	29	0.1
Pinnacles coarse sandy loam, 15 to 30 percent slopes	164	0.6
Pinnacles coarse sandy loam, 30 to 75 percent slopes	240	0.9
Santa Lucia channery loam, 30 to 75 percent slopes	139	0.5
Total	27,095	100.0

coarse, sandy loams appear to be the most representative of the developed soils in the monument. Igneous rock land, a complex of rhyolite rock outcrops and very shallow soils, is widespread.

The Laniger soil series is derived from rhyolitic (igneous) conglomerate. These Laniger soils are not from the same geographic formation as soils west of the Chalone Creek Fault, which separates them. The A horizon (topsoil) is 11 inches thick. Soil color is grayish brown and soil texture is a gravelly, sandy loam. The B horizon (subsoil) is 18 inches thick. Soil color is pale brown and soil texture is a gravelly, coarse sandy loam. Soil fertility of the Laniger soil series is low, water holding capacity is 1.5 to 4 inches, permeability is rapid, and runoff is rapid to very rapid. Distinct topographic features associated with the Laniger soil series include eroded badlands and semi-circular slumps.

The Sheridan soil series consist of well-drained to excessively well-drained loam soils derived from decomposed granite and other igneous rocks. Average soil profile depth is 18 to 24 inches, water holding capacity is 2 to 4 inches, runoff is rapid to very rapid, and the erosion hazard is very severe. Sheridan soil series supports dense vegetative cover which prevents erosion.

Sandy alluvial land is found in creek bottoms and valleys. Sandy alluvial land occurs mainly in the bottom of Chalone Creek and along Sandy Creek. The deep, coarse textured alluvium is slightly alkaline and has a water holding capacity of 4 to 6 inches. The alluvium is subject to removal and deposition, as well as occasional flooding. Sandy alluvial land supports riparian vegetation.

Typical of an alluvial floodplain, soils in the Bottomlands site are fairly deep, well drained gravelly sandy loams and sandy loams formed from conglomerate rock in the floodplain of Sandy Creek. These soils are thicker, up to 80 inches deep (200 cm) and more developed than in comparable valley areas inside the monument (NRCS 1969, NRCS 2009). The broad valleys and sandy loam soils support an extensive Valley Oak Woodland in Bear Valley. The upland landscape of the former Pinnacles Ranch exhibits many similarities to areas elsewhere in the monument, and contains similar topography, soils, and geology.

Soils in McCabe Canyon are quick-draining, gravelly coarse sand, formed in the stream terrace from conglomerate bedrock with higher organic content occurring nearer to the base of the slopes. Soils are approximately 60 to 80 cm deep and become loamy coarse sand at approximately 2 feet deep (0.6 m) (NRCS 2009).

Igneous rock land is found on rhyolitic conglomerate and consists of rock outcrops and very shallow, discontinuous soils. Igneous rock land soils are very shallow and excessively drained.

A more recent soil survey of Pinnacles National Monument was conducted in 2007 and includes newly added lands. This survey mapped 38 different soils in the monument (USDA 2007). The steepness of slope, acreage, and percentage of the monument covered by each soil type is given in Table 18.

Vegetation

BACKGROUND

Although Pinnacles takes up about one-tenth of 1 percent of the land mass of California, nearly 10 percent of all plants in the state are represented within the monument (Hickman 1993). Over 650 vascular plant species have been documented in Pinnacles National Monument, and many new species continue to be discovered (NPS 2007). In addition to the vascular plant flora, 293 species of lichens (NPS 2004) are known to occur in the monument. Although little is known about the diversity of mosses, it is projected that Pinnacles may have approximately 125-175 of the 600 mosses currently documented for California (Norris and Shevock 2004). The remarkable floristic diversity over such a relatively small area can be attributed in large part to the influences of the California's Mediterranean-type climate (NPS 1999), being located in a transitional zone between California's north-south distributional limits and its placement between the Coast Range and the interior Sierra Nevada system. Pinnacles National Monument is within one of only five regions in the world with a Mediterranean climate, which are known for their biodiversity.

SPECIAL STATUS PLANTS

Although there are no state- or federally-listed plants known to occur in Pinnacles National Monument, there are 14 plants listed as rare by the California Native Plant Society (Table 19) (CNPS 2010). A new species of *Streptanthus* being described from Pinnacles has been found nowhere else and will likely be added to this list. Nineteen species of lichens that occur in the monument are also listed as rare by the California Lichen Society. One particularly rare species of lichen (*Texosporium sancti-jacobi*) is known from only a few sites and has been ranked as critically endangered and is on the Global Red List of Lichens published by the International Committee for the Conservation of Lichens (Thor 1996).

VEGETATION ZONES AND TYPES

Twelve generalized vegetation types can be grouped into five major vegetation zones in Pinnacles (Table 20). An updated vegetation map and classification of the monument was completed in 2009.

Chaparral

Comprising over 70% of the monument, chaparral is characterized by a dense layer of shrub species with few or no trees and a sparse herbaceous understory. Chaparral is well adapted to tolerate the hot dry summers of a Mediterranean climate. Common chaparral shrubs in Pinnacles are: chamise (*Adenostoma fasciculatum*), buckbrush (*Ceanothus cuneatus*), manzanita (*Arctostaphylos glauca* & *A. pungens*), holly-leaved cherry (*Prunus ilicifolia* ssp. *ilicifolia*) and black sage (*Salvia mellifera*). Chaparral plants have adapted with strategies to survive and thrive in this harsh environment. These survival strategies include small waxy-coated leaves and deep taproots to reduce water loss, water storage structures, and summer dormancy to minimize transpiration during the arid summer months. Fires in chaparral tend to be intense and tend to scorch all above-ground vegetation. Even so, most plants, including chamise are able to rapidly resprout from their root-crown after fire, while other chaparral shrubs, such as buckbrush, germinate vigorously after fire. In fact, some species such as the Indian Valley bush mallow and golden ear-drops (*Dicentra chrysantha*) require fire to germinate.

Oak Woodland / Savanna

This vegetation type is dominated by either blue oaks (*Quercus douglasii*) or valley oaks (*Quercus lobata*) with a dense understory of herbaceous annuals. Oak woodlands are found in the monument in flat to steep sloping areas and alluvium where soils are deeper than where chaparral is located. Valley oak savanna are uncommon in the monument and are limited in distribution to the open, flat alluvium at the confluence of Chalone and Sandy Creeks such as the bottomlands. The herbaceous layer is generally dominated by non-native annual grasses (such as *Bromus* spp., *Vulpia* spp., *Avena* spp.). Native perennial grasses and forbs remain scattered throughout the oak woodlands. Oak savannas provide food for many species of animals within the monument. Acorns, fruits, seeds and vegetative parts of these plants provide food throughout the year. Many species of small mammals that use the chaparral as a home will venture out into the oak savannas to forage.

Valley oak (*Quercus lobata*) savanna is a rapidly disappearing ecosystem in California. Although valley oak

is found within the monument, many of the trees are more than 100 years old and are no longer regenerating. Valley oak is most common on the higher flood plains along rivers and streams, and it commonly is associated with riparian forests that support dominantly Fremont's cottonwood (*Populus fremontii*). These areas are known to be extremely fertile for use as agricultural cropland and grazing land; thus, much of the land suitable for valley oak regeneration has

TABLE 19: CNPS RARE VASCULAR PLANTS DOCUMENTED WITHIN PINNACLES NATIONAL MONUMENT

Common Name	Scientific Name
Douglas' spineflower	<i>Chorizanthe douglasii</i>
coast larkspur	<i>Delphinium californicum</i> ssp. <i>interius</i>
virgate eriastrum	<i>Eriastrum virgatum</i>
protruding buckwheat	<i>Eriogonum nudum</i> var. <i>indictum</i>
San Benito poppy	<i>Eschscholzia hypocoides</i>
Indian Valley bush mallow	<i>Malacothamnus aboriginum</i>
Paso Robles navarretia	<i>Navarretia jaredii</i>
slender nemacladus	<i>Nemacladus gracilis</i>
hooked popcorn flower	<i>Plagiobothrys uncinatus</i>
slender pentachaeta	<i>Pentachaeta exilis</i> ssp. <i>aeolica</i>
Brewer's clarkia	<i>Clarkia breweri</i>
Pinnacles buckwheat	<i>Eriogonum nortonii</i>
spring lessingia	<i>Lessingia tenuis</i>
dark-mouthed triteleia	<i>Triteleia lugens</i>

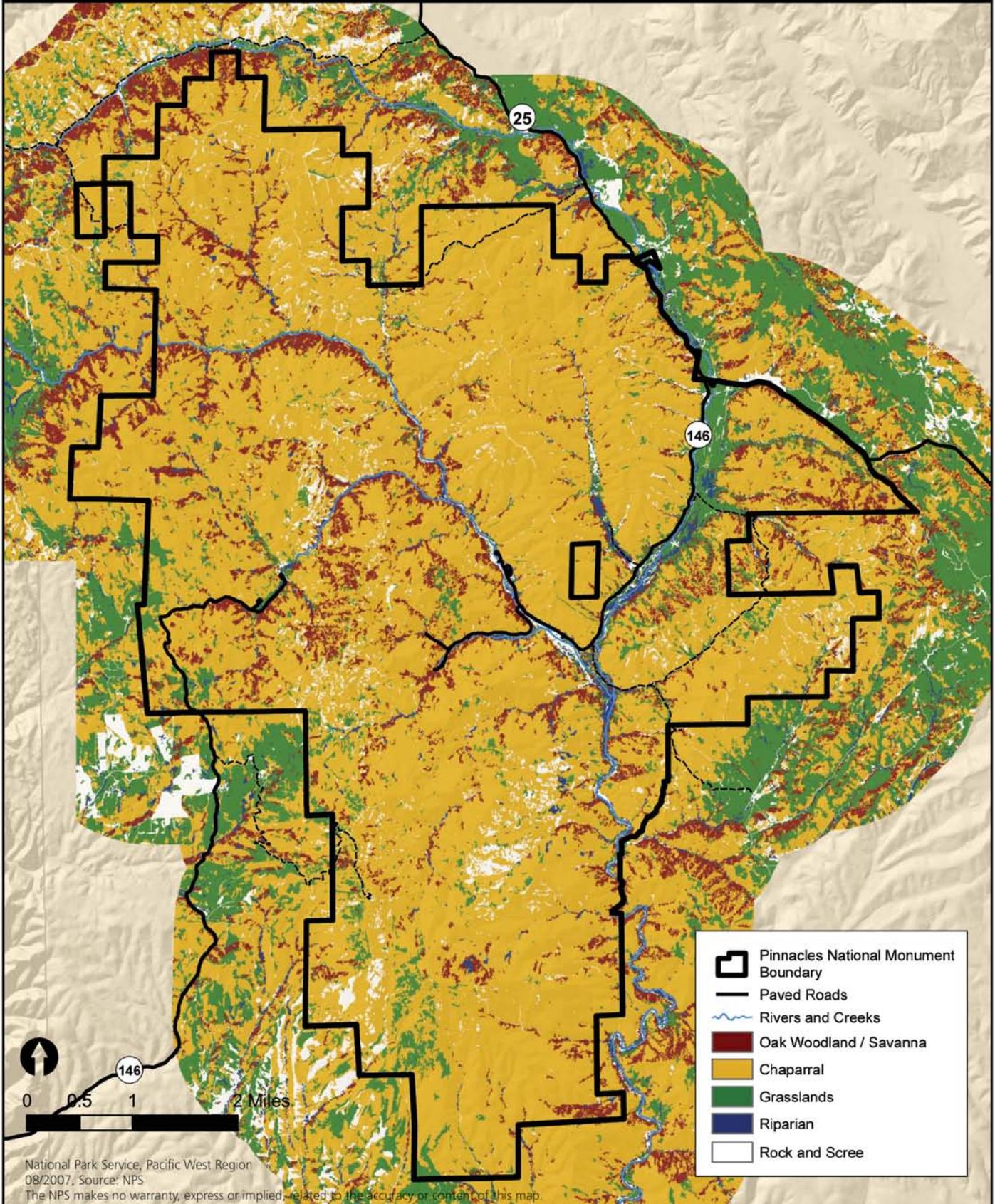
TABLE 20: FIVE VEGETATION ZONES AND 13 MAJOR VEGETATION TYPES FOUND WITHIN PINNACLES NATIONAL MONUMENT

Zone	Preliminary Alliances
Chaparral	coastal sage scrub mixed chaparral chamise chaparral manzanita chaparral hollyleaf cherry chaparral
oak woodland/savanna	blue oak woodland valley oak woodland
riparian woodland	riparian woodland southern oak woodland California buckeye woodland gray pine woodland
Grassland	grassland
scree and rock	herbaceous

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been lost as a result of destruction of the habitat and lack of adequate soil moisture (Adams and others 1992; Griggs and Golet 2002; Howard 1992; Meyer 2002; Olson 1998). Valley oak is a deciduous tree that requires large amounts of water at the rooting depth and the rich soil created by spring flooding (Pavlik and others 1993). Natural regeneration of the valley oak has been steadily declining, primarily because of the loss of habitat and removal of natural yearly flooding events (Sork and others 2002). Regeneration of valley oak woodland that is used by deer, rodents, and feral pigs is difficult because of predation of the seedlings within the first year. This woodland has been altered significantly as a result of the rapid drainage of water through the sandy soils, altered hydrology, increased annual grass understory, wildlife predation of the seedlings, and increased shade created by the older remaining valley oak trees.

Riparian Woodlands

The riparian vegetation type is restricted to the moist canyon bottoms, generally where surface water flows seasonally or intermittently. Dominant species in this type include sycamore (*Plantanus racemosa*), coast live oak (*Quercus agrifolia*), willow (*Salix* spp.), Fremont’s cottonwood (*Populus fremontii*).

Grasslands

Grasslands in Pinnacles National Monument are dominated by a dense layer of herbaceous plants with shrubs and tree playing a limited role in the type. The grasslands are dominated by Mediterranean annual grasses with scattered non-native forbs and native annual and perennial grasses and forbs. Some of the grassland areas that occur on the steeper slopes may be present due to frequent burning of chaparral sites (NPS 2005). McCabe Canyon contains extensive areas of intact native grasslands. Several species, including deergrass (*Muhlenbergia rigens*) and white-root sedge (*Carex barbarae*), are highly valued by Mutsun and other California Indian peoples to maintain cultural practices such as for use in basket weaving. Such large stands of these ethnobotanically important species are now considered rare in California (NPS 2010).

Rock and Scree

This vegetation is dominated by sparsely scattered herbaceous species shrubs. Soils are thinner than and tend to have fewer non-native species than in the other herbaceous dominated vegetation types in the monument. Although these areas appear rather sparse, they are relatively rich in species diversity, containing a wide variety of grasses and forbs.

HUMAN INFLUENCES

Vegetation at Pinnacles has historically been and continues to be directly and indirectly altered by human activities. These activities include: changes to the natural fire regime, invasion by non-native plants and animals, air pollution, disturbance/erosion from routine monument operations, and climate change. These activities have played a critical role in shaping the current vegetation patterns in the monument.

Non-native plants

Many non-native plant species have become well-established in Pinnacles. These invasive species displace native species and quickly colonize any disturbed area, natural or human caused. Many weed distribution vectors from visitors, administrative

TABLE 21: PRIORITY INVASIVE PLANTS IN PINNACLES NATIONAL MONUMENT

Species	Common Name
<i>Acroptilon [Centaurea] repens</i>	Russian knapweed
<i>Melilotus alba</i>	white sweetclover
<i>Nicotiana glauca</i>	tree tobacco
<i>Rubus discolor [procerus]</i>	Himalayan blackberry
<i>Salsola tragus</i>	prickly Russian thistle
<i>Silybum marianum</i>	blessed milkthistle
<i>Verbascum thapsus</i>	woolly mullein
<i>Carduus pycnocephalus/ tenuiflorus</i>	Italian thistle
<i>Centaurea solstitialis</i>	yellow starthistle
<i>Cirsium vulgare</i>	bull thistle
<i>Conium maculatum</i>	poison hemlock
<i>Cynodon dactylon</i>	Bermuda grass
<i>Brassica</i> spp.	mustard
<i>Hirschfeldia incana</i>	Summer mustard
<i>Plantago lanceolata</i>	English plantain
<i>Raphanus sativus</i>	wild radish
<i>Dittrichia graveolens</i>	stinkweed
<i>Piptatherum miliaceum</i>	smilo grass
<i>Tribulus terrestris</i>	puncturevine
<i>Phalaris</i> spp.	harding grass / canary grass
<i>Trifolium hirtum</i>	rose clover
<i>Verbascum blattaria</i>	moth mullein
<i>Arundo donax</i>	giant reed
<i>Iris pseudacorus</i>	yellow flag
<i>Tamarix ramosissima</i>	Saltcedar

(Note: As of 2011, the highest priorities for control are the weed species listed in bold-faced type).

activities, as well as adjacent land practices make Pinnacles especially vulnerable to the introduction of new non-native invasive species. As of 2010, there were 118 known non-native plant species in the monument. Most of these weed species will increase in spread following a fire. Not all non-native species can currently be effectively managed, so efforts are now focused on the most invasive and most controllable of the species present. Currently, yellow starthistle (*Centaurea solstitialis*), summer mustard (*Hirschfeldia incana*), stinkweed (*Dittrichia graveolens*) and Italian thistle (*Carduus pycnocephalus*) are four of the highest priority species. Other invasive non-native species may be found in the monument that will need management attention. In many cases, the most important reason for effective and responsive invasive plant control of high priority species is to protect adjacent uninfested areas. In Pinnacles, there are thousands of acres without large densities of targeted invasive plant species. Prompt and effective control of invasive species can protect these uninfested acres from future invasions. For this reason, Pinnacles has implemented an early detection program through the San Francisco Bay Area Inventory and Monitoring Network.

Table 21 shows a list of highest priority invasive non-native species known to in Pinnacles that have the

potential of reaching population densities that could require active management to control their spread within the monument.

Other species currently not documented in the monument or present but whose full distribution is unknown may also become priority species for abatement by monument staff. Species documented in Pinnacles may be added to the high priority species list if they are considered an ecological threat by the California Invasive Plant Council (Cal-IPC) or the California Department of Food and Agriculture. In order for a species to be added to the Pinnacles priority species list, they must meet one of the following criteria:

- Assigned a medium or high ranking on the California Invasive Plant Council (CalIPC) List of Invasive Plants of Greatest Ecological Concern and considered a CalIPC red alert species. The Cal-IPC List of Invasive Plants of Greatest Ecological Concern is list is available on the internet at: <http://www.cal-ipc.org/>.
- Considered a Class A, B, or C invasive species by the California Department of Food and Agriculture.

Prescribed burning of the non-native invasive yellow star thistle. NPS photo by Denise Louie.



Effects of non-native animals

Non-native animals, such as feral pigs, also play a role in altering the vegetation in Pinnacles. Multiple studies have examined the effects of feral pigs on vegetation in California and indicate that they do significantly alter native vegetation (Cushman 2004, Kotanen 1995). Prior to fencing of much of the monument boundary in the 1980s, feral pigs caused widespread habitat damage.

Effects of historic land use

Grazing by domestic animals and farming, particularly in the bottomlands, has undoubtedly altered the plant assemblages within these grasslands. These areas probably had significantly greater native plant diversity and fewer non-native species prior to extensive farming over the last two centuries, as farming techniques such as tilling has been shown to reduce native plant diversity in California grasslands (Stromberg 1996). Grazing, when properly managed, can have beneficial impacts to native grasslands.

Livestock grazing occurred primarily in the valley flats on the east side. Grazing by cattle continued through 2006 and was discontinued on a larger scale in 2007 to implement a restoration project to target the dense monoculture of yellow star-thistle (*Centaurea solstitialis*) through Integrated Pest Management techniques including prescribed burning, mowing, hand hoeing, prescribed goat grazing and herbicide application. This work will continue through at least 2015 where cattle grazing could be reintroduced for resource purposes.

Effects of Bear Gulch Reservoir

The dam on Bear Creek that forms Bear Gulch Reservoir, which was constructed by the Civilian Conservation Corps, has altered the hydrology of Bear Creek, reducing the number of natural flood events. This has reduced the capacity of cottonwoods, willows, sycamores, valley oak, sedges, and rushes to regenerate and has shifted some sections of Bear Creek to a more upland-dominated system.

NATIVE AMERICAN LAND USE

Indigenous peoples of California engaged in active land management through practices such as burning for results that met their everyday needs for plant materials. Over 100 plant species that occur within the monument have been documented as being traditionally used for medicine, subsistence, manufacturing and other purposes (Bocek 1984). Certain species, such as deergrass (*Muhlenbergia rigens*) and white root sedge (*Carex barbarae*), were frequently cultivated by Indian peoples to produce basketry materials. The practice continues today on a smaller scale. Knowledge and perpetuation of land management techniques of

California Indian people aids in a more holistic understanding of the composition, spatial array and extent of vegetation communities.

Wildlife

The monument's overlapping distributional limits, abutted tectonic plates and geologic characteristics, expanses of chaparral, spring-fed wetlands, diverse bottomlands, and protected status since 1908 have resulted in a refuge for biodiversity of wildlife species as well as genetic variability within species. Pinnacles is home to animals that occupy a transitional zone both latitudinally along California's North-South distributional limits and longitudinally between coastal and interior systems. This rich intersection of habitats supports:

- the world's highest known bee diversity per unit area - over 400 species within the monument
- a locally high diversity of reptiles (22) and amphibians (8)
- 46 native mammals, including 14 of California's 24 bat species
- 181 species of birds have been recorded in the monument, with 120 native species regularly observed and 95 native species of birds confirmed or believed to nest here
- 70 species of butterflies, at least 440 species of moths, 41 dragonfly species, and 1 native fish.

There are also numerous other invertebrate species and work is underway to better document their diversity. Species lists are posted and maintained on the monument's web site.

Preliminary investigations of the health of sedge beds with California Indian basketweavers. Photo by Chuck Striplen.



SPECIAL STATUS SPECIES

Many wildlife species within Pinnacles National Monument have special legal status. Such recognition requires careful review of potential management actions for impacts or benefits to these species. Special status species include the federally and state endangered California condor (*Gymnogyps californianus*), the federally and state threatened California tiger salamander (*Ambystoma californiense*) which breeds in stock ponds and summers underground in grasslands and oak woodlands, and the federally threatened California red-legged frog (*Rana draytonii*) which breeds and lives in streams and ponds.

Numerous state Species of Special Concern find habitat at Pinnacles:

- Amphibians: western spadefoot (*Spea hammondi*) and foothill yellow-legged frog (*Rana boylei*).
- Reptiles: Western pond turtle (*Actinemys marmorata*), Coast horned lizard (*Phrynosoma blainvillii*), silvery legless lizard (*Anniella pulchra pulchra*), and San Joaquin coachwhip (*Masticophis flagellum ruddocki*).
- Mammals: pallid bat (*Antrozous pallidus*), Townsend's western big-eared bat (*Corynorhinus townsendii*), western mastiff bat (*Eumops perotis californicus*), big-eared kangaroo rat (*Dipodomys elephantinus*), and American badger (*Taxidea taxus*).
- Migratory bird species known or likely to breed within the monument include: Cooper's hawk (*Accipiter cooperii*), sharp-shinned hawk (*Accipiter striatus*), golden eagle (*Aquila chrysaetos*), long-eared owl (*Asio otus*), loggerhead shrike (*Lanius ludovicianus*), and yellow-breasted chat (*Icteria virens*).
- Two raptors regularly nest in Pinnacles' cliffs: prairie falcon (*Falco mexicanus*) and peregrine falcon (*Falco peregrinus*).

Several species are endemic (occur nowhere else) to Pinnacles National Monument and surrounding area. Given their rarity and restricted ranges, these species listed below may warrant additional management consideration.

- Gabilan slender salamander (*Batrachoseps gabilanensis*), big-eared kangaroo rat (*Dipodomys elephantinus*), Pinnacles shield-back katydid (*Idiostatus kathleenae*), and Pinnacles riffle beetle (*Optioservus canus*).
- Two invertebrates have recently been discovered at Pinnacles, an amphipod (*Stygobromus sp.*), known only from a single spring, and a worm (*Eremidrilus sp.*), known only from Chalone Creek.
- A sphinx moth (*Euproserpinus sp.*) is under investigation as a possible new species to science and is known only from the monument and two other locations. With further study, discovery of additional endemic species is inevitable.

Of all the species currently known to occur at Pinnacles, the following percentages of major vertebrate groups have special status: 11% of mammals, 15% of probable nesting birds, 18% of reptiles, and 50% of amphibians.

EXTIRPATIONS AND RESTORATION

Historically, grizzly bears, wolves, and perhaps black bears and jaguars roamed the monument. All of these large mammals were extirpated by the early 20th century. Given current land use patterns and habitat loss in the region, it may not be feasible to reestablish these species to the Gabilan Mountains.

Monument biologists have reestablished two extirpated species back to the Pinnacles environs; the California condor and the California red-legged frog. Another frog species in consideration for re-establishment is the foothill yellow-legged frog. These frogs were present in Pinnacles National Monument up until



Photos (left to right): 1. California tiger salamander. 2. California red-legged frog. Photos by Paul G. Johnson.

TABLE 22: SPECIAL STATUS WILDLIFE SPECIES AT PINNACLES NATIONAL MONUMENT

	Common Name	Scientific Name	Status
Invertebrates	Unnamed lumbriculid worm	<i>Eremidrilus sp.</i>	3
	Unnamed amphipod	<i>Stygobromus sp.</i>	3
	Unnamed sphinx moth	<i>Euproserpinus sp.</i>	3
	Pinnacles shieldback katydid	<i>Idiostatus kathleenae</i>	3*
	Pinnacles riffle beetle	<i>Optioservus canus</i>	3*
Fish	Sacramento Perch	<i>Archoplites interruptus</i>	CSC*2,4
Amphibians	Gabilan slender salamander	<i>Batrachoseps gabilanensis</i>	3
	California tiger salamander	<i>Ambystoma californiense</i>	FT/ST
	Western spadefoot	<i>Spea hammondi</i>	CSC
	California red-legged frog	<i>Rana draytonii</i>	FT
	Foothill yellow-legged frog	<i>Rana boylei</i>	CSC*2
Reptiles	Western pond turtle	<i>Actinemys marmorata</i>	CSC*
	Coast horned lizard	<i>Phrynosoma blainvillii</i>	CSC
	Silvery legless lizard	<i>Anniella pulchra pulchra</i>	CSC
	San Joaquin coachwhip	<i>Masticophis flagellum ruddocki</i>	CSC
	Two-striped garter snake	<i>Thamnophis hammondi</i>	CSC 1
Birds	California condor	<i>Gymnogyps californicus</i>	FE/SE
	Cooper's hawk	<i>Accipiter cooperii</i>	WL
	Sharp-shinned hawk	<i>Accipiter striatus</i>	WL
	Bald eagle	<i>Haliaeetus leucocephalus</i>	SE
	Golden eagle	<i>Aquila chrysaetos</i>	WL/SP
	White-tailed kite	<i>Elanus leucurus</i>	SP
	Prairie falcon	<i>Falco mexicanus</i>	WL
	Peregrine Falcon	<i>Falco peregrinus</i>	SP
	Long-eared owl	<i>Asio otus</i>	CSC
	Loggerhead shrike	<i>Lanius ludovicianus</i>	CSC
	Yellow-breasted chat	<i>Icteria virens</i>	CSC
	Grasshopper sparrow	<i>Ammodramus savannarum</i>	CSC
Mammals	Pallid bat	<i>Antrozous pallidus</i>	CSC
	Townsend's big-eared bat	<i>Corynorhinus t. townsendii</i>	CSC*
	Western mastiff bat	<i>Eumops perotis californicus</i>	CSC*
	Big-eared kangaroo rat	<i>Dipodomys elephantinus</i>	CSC*3
	Western red bat	<i>Lasiurus blossevillii</i>	CSC
	American badger	<i>Taxidea taxus</i>	CSC

Key:

- CSC =California Species of Special Concern
- WL = California Department of Fish and Game Watch List
- F = Federal
- S = State
- E = Endangered
- T = Threatened
- P = Fully Protected
- * = Federal Category 1 and 2 species before revoked in 1996
- 1 = occurs around Pinnacles and has habitat here, but has not been confirmed
- 2 = historically occurred in Pinnacles, but is believed to be locally extirpated
- 3 = endemic to Pinnacles and surrounding areas
- 4 = possibly not native to Pinnacles

at least the 1940s, but the cause of their extirpation is unknown. Efforts to re-establish populations would involve translocation of egg masses or tadpoles from the nearest genetic stock. In 2008, evaluations were underway for this work, but concerns over chytrid fungus halted plans.

One species formerly extirpated from the monument, the peregrine falcon, has successfully returned due to both active hacking and dispersal enabled by regional recovery efforts. From 1989-1991, seven peregrine falcons were cross-fostered into prairie falcon nests at the monument. However, it was more than a decade before peregrines returned to breed at Pinnacles. There has been one peregrine nest each year from 2005-2012.

NON-NATIVE WILDLIFE SPECIES

Feral pigs are the most problematic non-native wildlife species at Pinnacles National Monument. Initially, it is thought that escaped domestic hogs began to be established as feral as early as the late 1700s after Spanish missionaries brought livestock into central California. They later hybridized with descendants of the European wild boar which were brought into the Gabilan Mountains and adjacent Central Coast regions during the early 20th century. Pigs were intentionally released in the area, hoping to create additional hunting opportunities. Many of the pigs survived and spread. By the 1970s, these feral pigs were regularly documented in Pinnacles National Monument. A variety of major impacts, such as destruction of wetland vegetation at wallows, tilling of soils, and limitation of oak reproduction occurred. In response, beginning in the 1980s, Pinnacles constructed an enclosure around 14,500 acres of the monument's core. The fence was completed in 2003 and by mid-2006 all pigs were eradicated from within the enclosure. The monument expanded the enclosure in 2010 and 2011 to eliminate feral pig impacts from additional sensitive habitats, newly acquired lands, and the campground. 11 miles of additional fence was constructed, enclosing an additional 3,250 acres on the east side of the monument. This area is expected to be pig-free by 2013.

Two additional non-native invasive mammals, the house mouse (*Mus musculus*) and opossum (*Didelphis virginiana*) are rare within the monument and not currently considered threatening to Pinnacles' native ecosystems.

Seven non-native species of birds occur at Pinnacles National Monument. Most conspicuous are the flocks of non-native wild turkey (*Meleagris gallopavo*). Introduced to the region multiple times in the past century as a game animal, the Rio Grande variety has flourished in recent decades. Although no population studies have been done on wild turkeys at Pinnacles, anecdotal observations suggest that several dozen

inhabit the monument. In addition to vast quantities of seeds (primarily acorns), turkeys are known to consume amphibians, reptiles, and invertebrates. Turkeys are thereby a direct threat to several rare or sensitive species. Three additional non-native birds commonly occur in the monument: European starling (*Sturnus vulgaris*), brown-headed cowbird (*Molothrus ater*), and rock pigeon (*Columba livia*). Starlings are cavity nesters and thereby compete with native species for a limited resource. Cowbirds are nest parasites and thereby limit the productivity of Neotropical migrants and other native songbirds. Rock pigeons are known to nest within the monument but are not believed to have an adverse effect on native birds. House sparrows (*Passer domesticus*) have also been intermittently documented in the monument in low numbers and chukars (*Alectoris chukar*) are considered rare. Eurasian collared doves (*Streptopelia decaocto*) were first observed at Pinnacles in 2010 and have expanded their range in the subsequent year. Further research is needed to determine the level of impact these non-native birds have on native Pinnacles species.

Several non-native fish species have been documented in Pinnacles National Monument in the past century. Currently, mosquitofish (*Gambusia affinis*) inhabit streams within the monument. Although this species is thought to have a minor impact on red-legged frogs, eradicating the population is currently impractical. Non-native catfish, probably black bullhead (*Ameiurus melas*), inhabited the Bear Gulch reservoir briefly during the late 20th century and were eradicated in the mid-1980s by draining the reservoir and electroshocking the remaining fish. Also, in the mid-1990s non-native green sunfish and/or bluegill (*Lepomis cyanellus/macrochirus*) infiltrated monument streams. They were considered a major threat to red-legged frogs, and were removed by electroshocking. Rapid response to such invasions is considered crucial to control efforts. Two other non-native fish were historically in the monument and were apparently naturally extirpated: fathead minnow (*Pimephales promelas*) and Sacramento perch (*Archoplites interruptus*). Further research is necessary to determine if Sacramento perch may be native.

American bullfrog (*Lithobates catesbeiana*) was reportedly common at Bear Gulch Reservoir in the 1950s, but is no longer established within the monument. Several bullfrog tadpoles were found and removed from Sandy Creek in 2006, likely washed into the monument from overflowing stock ponds during winter floods. In 2011, a juvenile bullfrog was found on Highway 25 a mile north of the park entrance. This species is a potential threat to California red-legged frogs and many other native wildlife species.

Argentine ants (*Linepithema humile*) are not established at Pinnacles, but a colony was inadvertently brought in and quickly eradicated in 2004. Despite their small size, these non-native ants are a major threat to California ecosystems. They aggressively displace many native ant species. Such displacement causes cascading impacts to many species, including horned lizards (which feed on large native ants), native plants (some of which rely on native ants for pollination and seed dispersal), and many invertebrate species (through predation, competition for resources, etc.). It is likely that without vigilant efforts to prevent future introductions, they will eventually become established at Pinnacles.

INVENTORY AND MONITORING

To date the following inventories have been completed: 1984 breeding bird survey, 1983-1985 and 1997-1999 bird surveys, and 2001-2002 landbird inventory; 1984 raptor survey; 1984-86 small mammal survey; 1991-1994 and 1998-2000 riparian amphibian/reptile surveys; 1996-1997 and 2011 bee and wasp survey; 1999-2001 butterfly inventory; 2001-2004 riparian aquatic species inventory (vertebrates and invertebrates); and 2004-2005 bat surveys. The San Francisco Bay Area Inventory and Monitoring (SFAN I&M) Network has put considerable effort into data mining in order to collect all available information from park files and published research papers. Ongoing landbird monitoring, using many of the same routes as studied in earlier inventories, is taking place on a 3 year cycle.

Under the SFAN I&M Network, additional inventories were conducted for small mammals, reptiles, and amphibians on the BLM lands added to the monument in 2000 and also on the newly acquired McCabe Canyon lands. Inventory work currently in progress includes a moth inventory, the first phase of which ran from 2002-2004. Due to the generally high diversity of invertebrates, inventories of these groups are much more demanding than for vertebrates. Many undescribed species are likely to be discovered, and it may take many years of effort to attain a significant level of completeness.

The longest term monitoring in the monument has been the breeding raptor monitoring program. Continuously performed from 1987 through the present, the program evolved from the 1984 raptor survey. Now under the direction of the SFAN I&M Network, data are gathered intensively on raptor breeding activities from January through June at the Pinnacles Rocks and adjacent areas. These data are used to manage climbing activity in the monument. California condors are also intensively monitored as an integral part of the restoration effort.

Currently under development by the SFAN I&M Network is a long-term monitoring protocol for pond-breeding amphibians. This is expected to be implemented by 2013.

Fire

Fire historically provided major ecological benefits to chaparral and valley oak savanna habitats in the Gabilan Mountains and Pinnacles National Monument. The primary ecological benefit periodic fire can provide is the maintenance of a diverse vegetation structure with mosaics of varied successional stages across the landscape. Other benefits can include increasing plant species diversity, control of insect and disease populations, and reduction of non-native invasive species populations. Disrupting and suppressing these ecosystem-regulating effects of the historic fire regime creates differing ecologic conditions.

NATIVE AMERICAN USE OF FIRE

Archeological evidence suggests seasonal or intermittent human occupation of monument valleys. Definitive local fire archeology is not available, but much can be deduced from regional central and southern California evidence. Native Americans in this region are historically and ethnographically known to have actively used fire as a management tool. Fire was employed to improve yields of plant foods, enhance quality of basketry materials, facilitate harvests, increase visibility of predators and prey, reduce the threat of wildfires adjacent to settlements, and possibly to reduce frequency of insect pests. Fires of varying intensity and size were used depending on the objective. This set of strategies led to a diverse mosaic of vegetation communities in varying stages of succession. It remains unclear, however, the degree to which these human induced fires influenced upper mountain slopes. Pinnacles National Monument's ancient fire history is being explored, using new scientific techniques, through an interagency effort funded by the Interagency Joint Fire Science Program. Studies of the Gabilan Mountains fire history suggest that such natural fires were probably infrequent autumn fires (Greenlee and Moldenke 1982).

POST-EUROPEAN INFLUENCE

The extensive fire history compiled by in 1982 by Greenlee and Moldenke on the Diablo and Gabilan Mountains began looking at the natural fire return intervals in the region. Unfortunately, some of the only trees available for dating were gray pines, which are short-lived and could only provide insight into the fire history and fire return intervals for the last 100 years. Most of this period is influenced by the protections and projects that occurred after the area became

a National Monument in 1908. For most of the 20th century, fire was suppressed with great success, thus limiting the frequency of fires normally predicted for a chaparral dominated landscape.

NATURAL FIRE REGIME AND INTERVAL

Available evidence suggests an average of one large fire (>2,500 acres) every nine years in the Gabilan Mountains and a reported fire return interval of 40 years. Approximately 146 lightning fires occurred in and around the monument between 1929 and 1978. There is little detailed information on the largest fires, but 3 historic fires apparently burned all or part of the monument in 1877, 1900 and 1931. In the past fifty years, smaller fires have collectively burned most of the Pinnacles repeatedly. Evidence from patterns of lightning ignitions indicate that naturally occurring lightning fires were probably infrequent, typically in the upper-slope and occurred in autumn. Depending on the type of vegetation that existed at the time, these fires were probably large. Today, the highly flammable chamise cover increases the potential for large lightning or human-caused fires.

FIRE ECOLOGY

Most of the monument is covered by chaparral, oak woodland, grassland, and rock scree vegetation types. Of these, chaparral is by far the most prevalent, covering roughly 80% of the monument's land area. In this vegetation type, plant life demonstrates several adaptations to reoccurring fires. For example, manzanita are able to resprout after fires, Ceanothus produce seeds at an early age and have roots that are specially adapted to grow in recently burned areas, Chamise produce a portion of seeds that require intense heat stress to germinate, and lupines are able to fix nitrogen from the atmosphere (fires reduce available soil nitrogen). Generally, chaparral plants sprout and grow quickly, and spread rapidly. Additionally, the structure, chemical composition, and low moisture content of mature chaparral encourage the rapid, complete combustion of chaparral shrubs in summer or fall fires, opening the landscape for growth of a new generation of plants. Other habitat types in the monument also demonstrate adaptations to periodic burning. Blue oaks resprout vigorously after fires and mature valley oaks survive low- to moderate-intensity fires. Oak post-fire regeneration is also benefited by animal dispersal of acorns. Native California grasses are better able to compete with widespread European exotics in landscapes influenced by fire. Monument vegetation communities are therefore adapted or resilient to fire influence. Nearly every fire in the monument, however, was suppressed for approximately 50 years until the monument's prescribed fire program began in the 1980s.

While the approximately 30- to 40-year burn interval in this area is a relatively lengthy fire return interval, there is evidence that the period of suppression affected overall species diversity and habitat for animals. Although attempts were made in the last 20 years to reintroduce fire into the ecosystem, timing, size, and behavior of fires did not simulate the natural fire pattern. As a result, many areas burned multiple times in this period and the resulting vegetation in these areas is not consistent with expected chaparral regeneration. In the last decade, the prescribed fire program has diminished to allow for ecosystem effects to be detected. Fire may be the only tool, however, to maintain the diversity and healthy structure of chaparral. In chaparral habitats, a mosaic of burned and unburned areas is necessary for the healthy maintenance and regeneration of plant and animal associations. There is a point, however, where these factors become detrimental due to increasing fragmentation of the habitat with the risk of converting open areas to nonnative annual grasses and forbs.

Fires are widely accepted as a natural part of chaparral ecosystems, and much of Pinnacles National Monument is dominated by fire-tolerant chamise and mixed chaparral plant communities. Most chaparral species are able to recover rapidly after fire, either as a result of vegetative resprouting or the presence of seeds that require hot fires to stimulate germination (Christensen and Muller 1975; Odion and Davis 2000; Keeley 1992a; Keeley 1992b; McMurray 1990). These chaparral communities are generally only briefly affected by fires, and in many cases are resprouting or germinating the next year. Once the chaparral stands become extremely dense, the understory herbaceous species all but disappear, most wildlife is not able to pass through them. In very mature stands, some chaparral species are not able to germinate and become established because of the shading and competition from the established shrubs. Fires generate openings that allow herbaceous species to become established, provide corridors and forage for wildlife, and allow chaparral species to regenerate and spread.

FIRE AND AIR QUALITY

Prescribed fire activities require compliance with the Clean Air Act. States have the responsibility to implement the provisions of the Clean Air Act as established by the EPA, including the authority to establish air quality standards and regulations. The monument complies with the Clean Air Act by adhering to the requirements of the California Air Resources Board and the Monterey Bay Unified Air Quality Control District. The most recent Pinnacles National Monument Fire Management Plan (June 2007) details procedures under which the monument applies for prescribed fire permits and reports fire activities.

Native Fire returns to Pinnacles. A prescribed cultural burn ignited as part of a collaborative study between the AMTB, National Park Services, California State Parks, San Francisco Estuary Institute and UC Berkeley and UC Santa Cruz. Photo by Rick Flores, UC Santa Cruz.



Cultural Resources

Pinnacles National Monument contains cultural resources including archeological sites, ethnographic sites, historic structures, cultural landscapes, and museum objects. One archeological district on the west side of the monument has been recorded and listed in the National Register of Historic Places as the “Chalone Creek Archeological Sites.” Other cultural resources have been determined eligible for listing on the National Register of Historic Places. These resources include the following:

- The Pinnacles East Entrance District (historic district) is a historic designed landscape that reflects the period of early monument development and administration and the craftsmanship of the CCC. The High Peaks Trail System, an outstanding example of a rustic-style trail system, is a component of the Pinnacles East Entrance District.
- The Ben Bacon Ranch Historic District is a cultural landscape that was determined eligible for its association with early subsistence and small-scale commercial agriculture in California.
- The North Chalone Peak Fire Lookout was determined eligible for listing for its association with California forestry and fire protection.

Historic Overview

Although relatively little archeological research has been conducted in the Gabilan Mountains where Pinnacles is located, the region has likely been occupied by humans for at least 8,000 years, and possibly longer. The ethnic groups present in the Pinnacles area at the time of European contact were part of the Ohlonean (or Costanoan) subfamily of Penutian-speaking peoples. They are believed to have migrated to coastal California from the interior, first arriving on the east shore of the San Francisco Bay about 3,500 years ago. From there they moved south, eventually reaching Pinnacles between 2,500 and 1,500 years ago, probably displacing an earlier Hokan-speaking people. The Ohlone who settled on the east side of Pinnacles became known as the Mutsun, while those who settled on the west were known as the Chalon. Each Ohlone group occupied a single, well-defined territory, but members would move within this territory throughout the year in response to seasonal harvests of native food and fiber sources. In addition to many transitory villages or occupation sites associated with these annual movements, each territory also contained at least one permanent village, from which the group generally took its name.

Pinnacles National Monument lies within the Gabilan Mountain Range, which separates the San Benito

Valley on the east and the Salinas Valley on the west. Agricultural development began in the Salinas Valley shortly after 1770 in association with the Spanish colonial capital at Monterey and *Mission San Carlos Borromeo* in nearby Carmel, both of which were established along the coast that year. Another mission, *Nuestra Señora de la Soledad*, was established further inland in 1791 on the eastern edge of the Salinas Valley almost directly below the Pinnacles. Further to the north, *Mission San Juan Bautista* was established in 1797 along one of the most important transportation corridors connecting the coast with the interior of California. This corridor had been used for thousands of years by Native Americans. It was adopted by Spanish colonists in the eighteenth century and incorporated into the *El Camino Real* (The Kings Highway).

During the mission period, which lasted from 1769 until 1833, nearly all of the native peoples living in the vicinity of the Pinnacles were removed from their ancestral homes and forced to live in or around the missions in order to be converted to Christianity and acculturated to a Spanish way of life. The majority died of European diseases. The reduction of the Chalon people of Pinnacles at Mission Soledad was mostly complete, and few remained to live outside of the mission system by 1833. A small community of the descendents of these people has recently been identified living in Southern California. Northeast of the Pinnacles, some of the native Mutsun avoided reduction at Mission San Juan Bautista and Mission Santa Cruz and continued to live in their ancestral lands well into the American period, but their traditional lifeways had been altered irrevocably by European colonization. For the most part, the surviving Mutsun and Chalon assimilated into both Mexican and American societies, where they worked as ranch hands, miners, and agricultural laborers. Their descendents remain in the area today.

Following the secularization of the missions in 1833, the extensive lands once controlled exclusively by the Franciscan missionaries, and managed by their Native American neophytes, were distributed in large grants to prominent Mexican citizens, known as *rancheros*. The *rancheros* raised immense herds of Spanish longhorn cattle, which they slaughtered for hides and tallow, selling these products to foreign merchants in coastal ports like Monterey. The Pinnacles did not lie within any of the Mexican-era ranchos but was adjoined by several. Just south of the Pinnacles, lying across the breadth of the Gabilan Range, was the vast *Rancho San Lorenzo*, and along the floor of the Salinas Valley just west of the Pinnacles was the *Rancho San Vicente*. On the east side of the Gabilans, several miles north of the Pinnacles, was the *Rancho Cienega de los Paicines*. Bear Valley lies between Paicines and *Rancho*

San Lorenzo and was used intermittently for pasturage by livestock from both places but was never formally claimed by either one. The *Rancho San Vicente* and adjacent ranchos in the Salinas Valley were physically closer to the Pinnacles, but the rugged, chaparral-covered hills which rose abruptly from the valley floor discouraged travel to the Pinnacles from this direction or utilization of the lands around the rocks.

With the conclusion of the Mexican-American War in 1848, American immigrants began arriving in California in vast numbers. Most were drawn at first by the discovery of gold in the Sierra Nevada foothills. A few years later, in 1852, the discovery of mercury in the Diablo Range about forty miles east of the Pinnacles also drew some miners to this remote region but had comparatively little effect on the Pinnacles themselves. By the late 1860s, however, most of the gold frenzy had subsided and the new immigrants began turning to agriculture, establishing small homesteads throughout the arable regions of the state. Most of the land which had been settled during the Spanish and Mexican periods was already taken up in large ranchos, however. Mexican land grants accounted for nearly all of the cultivable land in the Salinas Valley, for instance, and discouraged homesteading in this region. The rugged hills above the Salinas Valley were the only exception to this pattern on the west side of the Pinnacles, but only a few settlers were bold enough to try farming in this rugged country. One of these, Harrison Lyons, established a homestead around 1885 which now lies within the boundary of the monument. His farm never grew to any substantial size or value but is a good example of the rather marginal living a subsistence farm could support in this environment.

In 1870, Henry Melville established a mineral claim on the west side of the Balconies, near the land Harrison Lyons would later settle on. Over the next few decades, he expanded his claim substantially, though he never sank more than a few shallow tunnels into the supposedly rich copper vein he said he had discovered. His real wealth came from the shares he sold in this mine to gullible foreign investors. Eventually these investors grew weary of Melville's failure to produce any metal, but by that time, the Pinnacles were becoming a popular destination for sightseers, and Henry Melville's mineral claims lay directly in the path of anyone wanting to reach the spectacular formation from the Salinas Valley. By 1920, he had built a gate and was charging an entrance fee. He even bought a small bus and began conducting tours to the Pinnacles from Soledad. His monopoly over the principal access point from the west would prevent the NPS from developing this side of the monument for decades after its establishment.

Unlike the Salinas Valley, much of the land east of the Gabilan Range was unencumbered by Mexican grants at the time American settlers began looking for homesteads. This was one of the principal attractions of Bear Valley. The first homesteaders arrived here in 1865. Within a few decades, they had built a relatively prosperous community of moderately-sized farms practicing diverse but non-intensive dry land agriculture and pastoralism. The principal cash products were livestock (sheep and cattle), cereal grains and dairy. These early homesteaders were the first to use the Pinnacles for recreational purposes. During this time, a primitive road was built from Merrin Canyon up Chalone Creek to the eastern side of the Balconies and a picnic area was established there. It was used primarily on holidays. The Bacon family, who settled on Sandy Creek near the mouth of Bear Gulch, lived closest to the Pinnacles. Their children grew up exploring the caves and rock formations and would later act as guides for visitors when they began coming to the Pinnacles around the turn-of-the-century. The Bacon boys were often joined by their friend, Schuyler Hain, who had homesteaded a few miles further up Bear Valley in 1891. It was Hain who realized that the Pinnacles were extraordinary enough to attract visitors from throughout the state or even the nation, and he proposed preserving the formation as a public park and promoting it for tourism. Through Schuyler Hain's efforts, and the assistance of David Starr Jordan, president of nearby Stanford University, a forest reserve was created in 1906. In 1908, Pinnacles National Monument was formally established as the twelfth monument under the Antiquities Act. It contained only 2,080 acres in the midst of the original forest reserve (which was then dissolved for lack of a forest).

During the first two decades of its existence, Pinnacles National Monument was developed and maintained largely through the efforts of local volunteers and county organizations. The first custodian of the monument, Herman Hermansen, was a local homesteader who was hired by the NPS in 1922 for the nominal salary (even then) of \$12 a year. He and a few of his neighbors built a rudimentary trail system and developed a lodge and campground in Bear Gulch at the site of the present nature center. These were the first developments to be made in Bear Gulch. Hermansen also challenged Henry Melville's claim on the west side of the Balconies, initiating a long series of lawsuits which would eventually result in the nullification of Melville's claim and the transference of the property to the National Park Service (though not until 1958). In 1925, the first road to the top of Bear Gulch was constructed by the County of San Benito with the assistance of the Hollister Farm Bureau and its president, W.I. Hawkins. Later that year, Hawkins replaced Hermansen to become the second custodian

of the monument, a position he held for the next twenty years.

It was not until 1928 that the NPS committed itself to fully developing Pinnacles National Monument. The first development outline—predecessor of the master plan—was prepared that year. Over the next five years, much of the basic infrastructure of the monument was designed and constructed by NPS staff working under the direction of the then western Field Headquarters in San Francisco. This early development included most of the High Peaks and Condor Gulch trails as well as visitor and administrative facilities in Bear Gulch. The latter included a ranger's residence, two rustic comfort stations, a campground and sanitary utilities. No development was undertaken on the west side because Henry Melville still controlled access to the monument from the Salinas Valley.

In 1932, a substantial allotment was made for road construction from President Hoover's unemployment relief act. This was used to construct the present entrance road from Chalone Creek up to the top of Bear Gulch.

In the fall of 1933, a CCC camp was established at the monument on Chalone Creek. This program—formally called the Emergency Conservation Work—was established under President Franklin Roosevelt's Federal Emergency Relief Act. It put thousands of young men to work on federal and state lands throughout the nation doing forestry conservation work and light construction. The CCC became one of the most popular of Roosevelt's Depression-era assistance programs. The CCC was active at Pinnacles National Monument until early 1942, when the entire program was shut down as a result of America's entry into World War II. During these nine years, CCC enrollees expanded and improved the existing trail system and built, or helped build, a number of new structures. These included the Bear Gulch nature center, the Condor Gulch utility area, the superintendent's residence, the stone entrance pylons along Chalone Creek, two rustic pit toilets on North Chalone Peak and Scout Peak, and the Bear Gulch Dam. The CCC was also responsible for much of the existing landscaping in the Bear Gulch headquarters and picnic areas. The intensive physical development that occurred during this relatively brief period of time was guided by comprehensive master plans, the first complete set of which were prepared by the NPS Branch of Plans and Design in 1933. These planning sheets were updated every few years until 1942.

With acquisition funds made available through the NPS 50-year anniversary, Mission 66, the remaining private inholdings in the monument were acquired. These included the old Melville property in the Balconies,

finally allowing development of the west side to begin. One of the first projects to be undertaken there was construction of the Balconies Rim Trail in 1963, connecting the east and west sides of the monument through the Old Pinnacles. This was followed in 1966 with improvement of the west side access road and the construction of visitor facilities and temporary residences for staff in the Chaparral area. On the east side, formal campgrounds were constructed on both sides of Chalone Creek adjacent to the now-abandoned CCC camp.

Most of the work done during the Mission 66 period was consistent with the development plans which had been outlined for the monument since the late 1920s. By the 1970s, however, rapid growth throughout the greater central coast region began to put pressure on the monument's resources as visitation steadily increased. It became apparent that further development of existing facilities alone would not be sufficient to meet the growing demands. In response, the next few decades were devoted largely to reassessing existing patterns of development and coming up with a new long-term vision for how development should (or should not) occur.

In 1976, a new master plan was produced outlining the most important principles which had resulted from this reassessment. At the heart of the plan was a list of proposals which included converting the monument to day-use only; shifting the focus of use to the west side, which could better accommodate larger volumes of short-term visitors; removing visitor use facilities and staging areas to the edges of the monument, and moving administrative facilities and staff housing

out of the monument altogether. The idea was that development should be concentrated away from the most sensitive areas in the monument so that greater numbers of visitors could be accommodated without degrading the resources they had come to experience.

These original proposals were refined over the following decade and resulted in separate Development Concept Plans (DCPs) for the east and west sides that were completed by the early 1990s. The west side DCP proposed building a visitor center, parking area and support facilities in recently-acquired land on the western edge of the monument and removing most of the existing development from the environmentally-sensitive and scenic Chaparral area. This proposal has only now been fully implemented.

The east side DCP proposed a similar plan, with existing development at Bear Gulch to be kept largely as a trailhead picnic area and cultural exhibit which would interpret the CCC. A new visitor center and administrative facilities would be constructed on Sandy Creek, just inside the eastern boundary of the monument, while maintenance facilities, which had relocated to the old CCC camp after World War II, would be concentrated near the bottom of Bear Gulch in the former YACC area, a small facility which had been established for the Young Adult Conservation Corps in the mid-1980s. The Chalone Creek Annex, site of the old CCC camp, would be maintained as a trailhead picnic ground and staff residential area. All other development would be removed, including the maintenance yard and remaining CCC buildings, the campgrounds, and the road above the Annex.



Henry Melville's cabin on the west side of the monument before it was torn down in the late thirties or early forties. NPS photo.



Photos (left to right): 1. Some of the original homesteaders (Myron Bacon with beard on left), ca.1880. Photo from Grace Robinson album, courtesy of Deborah Melendy Norman. 2. Ben and Orea Bacon seated in front of their house, ca. 1894. Photo courtesy of Deborah Melendy Norman.

A severe storm during the winter of 1998 forced reconsideration of both plans. Floodwaters destroyed part of the Chalone Creek Annex campground, hastening its retirement. But they also destroyed the YACC area, and forced planners to abandon the idea of ever developing this site. It was subsequently restored to a natural condition, while the maintenance complex remained upstream at the Chalone Creek Annex. The road above the Annex was also taken out as part of this post-flood restoration project. Staff housing was relocated from Bear Gulch to new facilities in the Annex, as proposed in the DCP, but no other changes occurred in Bear Gulch, and the former visitor center (now nature center) and administrative facilities remain there.

By the end of the 1990s, conditions had once more changed sufficiently to justify a new planning effort, but this was postponed when President Clinton authorized the enlargement of Pinnacles National Monument by nearly 11,000 acres in January 2000. The monument had already been enlarged seven times since the original 2,080 acres had been set aside in 1908, growing to almost 17,000 acres by 1980. This proclamation represented the single largest increase in the monument's history. Approximately 8,000 acres were transferred immediately from adjacent public lands, while negotiations began for the purchase of an additional 3,000 acres of private land on the east side of the monument. The largest proportion of this was a single parcel—the Pinnacles Ranch—comprising nearly 2,000 acres. It constituted most of the area around Sandy Creek between the eastern boundary of the monument and Highway 25. This was the land which had originally been settled by the Bacon and Butterfield families nearly a century-and-a-half earlier, and the area is rich in historic significance. Both the George Butterfield and Ben Bacon homestead sites are extant and have been

determined eligible for the National Register. They lie within the designated Ben Bacon Ranch Historic District. Upon acquisition of the Pinnacles Ranch in 2006, the GMP planning process began to consider a host of new opportunities and challenges that had been created by expansion of the monument.

Archeological Resources

ARCHEOLOGICAL SITES

Thirty-seven archeological sites and several isolated artifacts and features have been inventoried within Pinnacles National Monument and it is expected that additional sites and isolates will be recorded in the future. The known sites are located in both San Benito and Monterey Counties and all but the newly discovered have been entered into the NPS Archeological Site Management Information System (ASMIS), an agency-wide inventory database. Both prehistoric and historic era sites are represented. One archeological district consisting of three Native American prehistoric sites on the west side of the monument was listed in the National Register of Historic Places as the “Chalone Creek Archeological Sites” district in 1978. No Native American rock art sites have yet been discovered though that possibility remains. The sites can be characterized and counted as shown in the Table 23.

The historic era sites are mostly the remains of homesteads, their associated water features, and mines or mining related sites. Exceptions include a stone masonry drainage channel apparently built by the CCC and an artifact deposit associated with a significant fire lookout on North Chalone Peak. Archeological features include masonry walls and ruins, trash deposits and artifact scatters, fence posts



Photos (left to right): 1. Park Service Director Stephen Mather with the Pinnacles Boys in 1924. Herman Hermansen is third from left; Mather is to the right of Hermansen; and the older man with his hands resting on a wooden staff is Schuyler Hain. 2. Chalone Annex group campground, 1965. NPS photos.

and wire fence strands, agricultural implements, planted trees, adits, shafts and mine timbers, all from the American period of settlement. No Spanish or Mexican era sites are known within the monument despite its proximity to the Mission Nuestra Senora de la Soledad and El Camino Real or to Mission San Juan Bautista. Indians and Mexicans were present throughout the American settlement period though, and were active participants in agricultural and mining activities. It has been hypothesized that during the Spanish period the Pinnacles may have functioned as an isolated geographic refuge for Indians seeking to avoid conscription or recapture by the Mission system, but no evidence or analyses have yet been developed to support that proposition.

On the basis of site characteristics including the presence of shallow hopper, bedrock mortars and the relatively few artifacts that have been collected (many without good provenience), the known Native American archeological sites appear to date to within the last 1000 years but there is an expectation that evidence of earlier Native American occupations will be discovered in the future. The presence of at least one on-site milling slab, portable bowl mortars and several large contracting-stem projectile points in the monument's museum collection may indicate a greater antiquity of occupation. No archeometric dating has been done and no typologically datable shell beads or ornaments have yet been found. Several pieces of obsidian have been collected but chert flakes and artifacts are more numerous. Only one midden site has been tested archeologically, with minimal results.

On the basis of historic and ethnographic information the prehistoric sites are associated with the Ohlone Indians (earlier known as the Costanoan Indians)

who spoke languages of the Penutian stock. Penutian speakers may have migrated to the area sometime between approximately 3500 and 2500 years ago. More specifically, the Mutsun and Chalone bands of Ohlone Indians are known to have occupied what is now the monument prior to contact with the Spanish. The Mutsun and Chalone bands of Ohlone are the groups directly associated with the Pinnacles and their descendants still live in the area and elsewhere in California. In particular, the Amah Mutsun band, already recognized by the State, has applied for federal re-recognition. The potential for earlier occupations at Pinnacles though could indicate additional associations with earlier, native peoples who were the ancestors of the neighboring Salinan and Esselen peoples to the west. These peoples spoke languages of the Hokan stock. It is theorized by anthropologists that Hokan speakers occupied the area prior to the arrival of the Penutian speakers. Salinan groups may also have visited the Pinnacles area during Ohlone times, especially on the west side of the monument. Neighboring Northern Valley Yokuts groups to the east may also have visited.

Together, the prehistoric archeological sites of Pinnacles represent a Native American hunting and gathering economy where plant resources were actively managed integrated into a regional trade network capable of providing at least small amounts of obsidian for tools. This economy would be consistent with the local presence of small and large game animals; nut bearing trees including gray pine, coast live oak, valley oak, and buckeye; seed producing native grasses and wildflowers; and stands of deergrass and Santa Barbara or white root sedge used in basketry for which California Indians are well known.

TABLE 23: ARCHEOLOGICAL SITES

Predominant Site Characteristic	Site Count	Notes
Rock Shelter	3	Typically associated with small middens
Bedrock Mortar	10	Sometimes associated with middens
Lithic Scatter	10	Primarily flakes and debitage associated with the manufacture of stone tools
Prehistoric Midden	2	Comparatively larger middens with bedrock or portable mortars
Historic Era Features and Artifacts	12	19th and 20th century homestead, mining water management and fire lookout sites
Total	37	

Native American prehistoric sites are typically located near streams or springs and may indicate a comparatively low or seasonal population of Native Americans during their periods of use, since sites are relatively small and are not numerous. No major village sites have yet been identified. Furthermore, reliable year-round water sources were somewhat limited and no human remains have yet been observed or referred within the monument. The linear distribution of the sites and the relatively short distances between them may also indicate that resource exploitation was intense, efficient and well suited to one or several small groups. Though fresh water sources would have made year round habitation possible it is likely that the seasonal availability of edible seeds and nuts would have governed the cyclical movements of hunting and gathering peoples into and out of the area.

ARCHEOLOGICAL SITE CONDITION

With assistance from NPS archeologists Pinnacles National Monument is in the process of evaluating the condition of its archeological sites using the national criteria established for use with ASMIS. Site condition is based primarily on the observed physical stability of the site and the apparent level of threat or endangerment from factors such as erosion, vandalism or other ground disturbing activities.

At the end of 2011 the monument had 36 archeological sites listed in ASMIS. Of those, 17 sites were in good condition, 10 were in fair condition, five required new evaluations and four were not relocated because of vegetation and soil cover. Primary threats to archeological resources include alluvial and colluvial erosion; unintentional visitor impacts resulting from the close proximity of trails and facilities; intentional looting of artifacts by visitors; bioturbation by small and large mammals including feral pigs; utility line maintenance activities that entail ground disturbance and brush removal, and high temperature wildfires. Many of these threats can be managed through site monitoring, more effective project planning and review, public education, prescribed fires, and trail realignment.

REGIONAL CONTEXT

Pinnacles National Monument is within California's Central Coast Region for archeology (Moratto 1984). Within the region much archeological work has been done in Monterey County, especially along the coast. This has resulted in a chronological series of radiocarbon dates for the human use and occupation of the region starting at approximately 8,000 years before present. In other parts of California, for example at Borax Lake to the north and Channel Islands to the south, human use and occupation has been dated much earlier from approximately 10,000 to 12,000 years before present.

Comparatively little archeological work has been done in San Benito County though, including most of Pinnacles National Monument. If the prehistory of Pinnacles as part of the Gabilan Range reflects that of the Diablo Range to the east, then sites representative of the early, pre-ethnographic "Hunting Culture" (Jones and Klar 2007) may be present. The Hunting Culture has been dated in the Diablo Range to as early as 5,500 years ago, with more intensive occupations emerging approximately 4,500 years ago. The Hunting Culture concludes at approximately 1,000 years before present at which point the ethnographically known cultures of the Ohlone and Salinan are taken to encompass the archaeological record. Earlier inland Hunting Culture sites are characterized by large contracting stem and square stem projectile points and other bifacial tools along with milling slabs and occasional bowl mortars, while later sites often exhibit small, side-notched arrowheads, olivella and steatite beads, and bedrock and hopper mortars. The Hunting Culture changed through time, incorporates both Hokan and later Penutian speakers, and included important transitions such as a greater reliance on acorns for food, the use of the bow and arrow for hunting and warfare, and the development of more complex economies including local and regional trade networks. Native populations gradually grew in size with notably larger increases during the last 1,000 years, based on the number of dated archeological sites.

ARCHEOLOGICAL SURVEY COVERAGE

Only 12% of Pinnacles National Monument has been surveyed for archeological sites and only one prehistoric site (CA-SBN-123) and one historic era site (the Ben Bacon Homestead Artifact Scatter) have been tested by excavation. Pinnacles is not well integrated into the archeology of the region and because of the limited research done in the monument, it has not yet made a substantial contribution to it though it has clear archeological potential.

Eight archeological surveys, each covering a relatively substantial acreage, have taken place at Pinnacles and they resulted in the discovery and recording of the majority of the monument's known sites. Survey methods employed a mixture of both reconnaissance and intensive level survey techniques. A chronology of these surveys follows.

The first survey was conducted for NPS in 1967 by private contractors who recorded 13 prehistoric archeological sites in drainages along the monument's primary trail systems (Olsen, Payen and Beck 1967). The next survey was conducted in 1981, also under contract to NPS, and included survey of newly acquired lands, updating of existing site records based on new site visits, and recording of an additional 11 sites including several historic homesteads (Haversat, Breschini and Hampson 1981). These were the first historic era archeological sites recorded at Pinnacles. Also in 1981, on former BLM lands transferred to Pinnacles, the BLM conducted an archeological survey of over 1,200 acres for the Horse Valley Chaining project but recorded only one lithic scatter. Following the Stonewall Fire of 1997 a survey crew from the NPS Western Archeological & Conservation Center (WACC) at Tucson updated site records for sites along the South Wilderness Trail and added two new sites to the inventory (Schub 1998). In 1999 WACC archeologists also recorded a CCC stone masonry drainage channel near an employee housing area (Shirley 2000) as part of a compliance survey. In 2001, on private lands now part of Pinnacles, the California Department of Transportation surveyed the corridor of Highway 146 on the east side of the monument and recorded several archeological resources including two prehistoric sites (Mikkelsen 2000). The site of the new West Pinnacles Visitor Contact Station was surveyed in 2002 by WACC with negative results (Corey 2002). Archeologists from Yosemite National Park surveyed approximately 260 acres in the former Pinnacles Ranch area in 2008 and recorded the historic Butterfield homestead (Gavette 2008). In 2011, a UC Berkeley Archeological Field School in conjunction with the NPS and the Amah Mutsun tribal band conducted a survey of McCabe Canyon and other areas.

A number of smaller, compliance surveys have been conducted over the years, usually with negative results. One recent exception was the survey and test excavation conducted for the Sandy Creek Bridge Replacement project which identified the Ben Bacon Homestead Artifact Scatter (Engel 2011).

ARCHEOLOGICAL RESEARCH POTENTIAL AND RECOMMENDATIONS

An initial NPS archeological overview and assessment summarizing the archeology of Pinnacles National Monument was completed in 1978 (Fritz and Smith 1978) when the monument was much smaller and only 13 sites had been recorded. A new and expanded overview and assessment was completed in 2011 (Massey with Gardener and Engel 2011) that included updated documentation and records for 22 sites and the recording of six newly discovered sites. In addition, new research and management recommendations based on a better knowledge of the resources were presented.

Broad recommendations include but are not limited to systematic archaeological survey to identify and document expected prehistoric and historic era sites; limited archaeological testing of known and expected sites to establish their chronology, significance and eligibility for listing in the National Register of Historic Places (NRHP); and further development of the predictive site model newly presented in the 2011 overview and assessment.

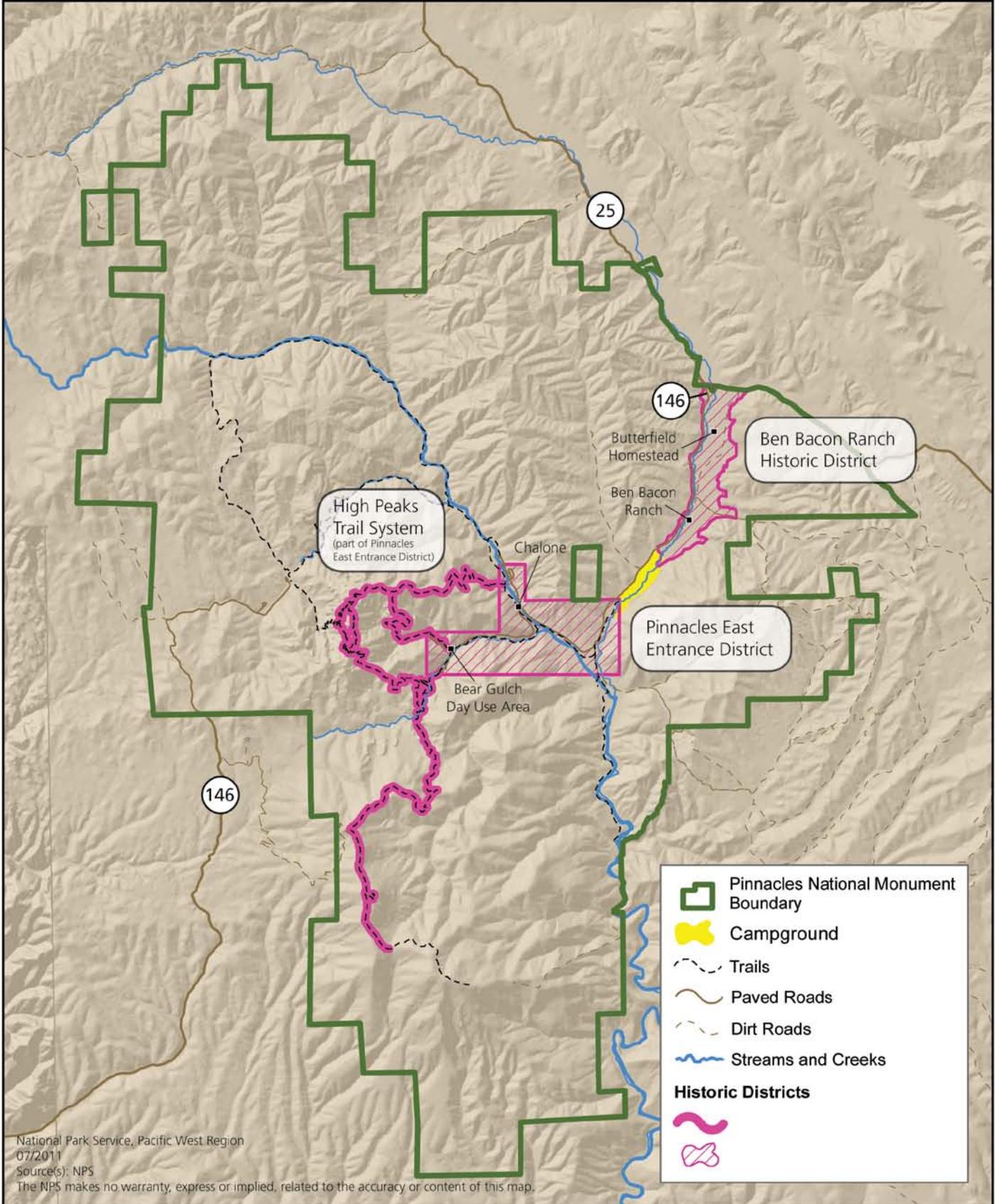
More specific research recommendations indicate the archeological research potential of the monument and include but are not limited to:

- defining and explaining prehistoric settlement patterns and the seasonality of Native American site usage within the context of ethnographic knowledge and the archaeology of the region
- defining and explaining patterns and dynamics of inter- and intraregional trade
- identifying and recording rock art sites (as yet unknown at Pinnacles)
- investigating homestead and mining sites with a focus on determining intensity of use, resultant changes to the landscape, and contributing to development of a landscape history of the monument
- identifying and investigating Civilian Conservation Corps (CCC) deposits to better document and understand the conditions of life and work for the CCC, which built many of the significant structures and trail systems of the monument
- reevaluating, updating and expanding the Chalone Creek Archeological Sites National Register District

Cultural Resources

Pinnacles National Monument

National Park Service
U.S. Department of the Interior



The potential for meaningful archeological research at Pinnacles National Monument is considerable and the resultant knowledge would benefit the public by enabling NPS to better understand, protect and interpret the archeological resources of the monument. In addition, the additional knowledge gained through research would be of direct interest and value to Native American descendant communities such as the Amah Mutsun and Chalon peoples.

Historic Structures and Cultural Landscapes

A total of 42 structures are recorded on the List of Classified Structures (LCS) for Pinnacles National Monument, 31 of which have been determined eligible for listing on the NRHP. Another nine have not been formally evaluated, while two others were determined to lack eligibility but are still managed as cultural resources. These range from buildings to smaller scale elements such as retaining walls and trails. With the exception of the masonry drainage channel apparently built by the Civilian Conservation Corps (CCC), the historic era sites are the remains of homesteads (foundations, masonry, trash deposits, wire fencing, etc.) related to dry land subsistence agriculture from the early American period of settlement. No Spanish or Mexican era sites are known to exist within the monument.

CULTURAL LANDSCAPES DETERMINED ELIGIBLE FOR THE NATIONAL REGISTER

Pinnacles East Entrance District

The Pinnacles East Entrance District (historic district) is a cultural landscape determined eligible for the National Register of Historic Places by the California State Historic Preservation Office.

The Pinnacles East Entrance Historic District is a 797-acre historic designed landscape within Pinnacles National Monument, one mile east of the geologic formations that give the monument its name. The features associated with the district reflect the period of early park development and administration and the craftsmanship of the CCC and are generally located along the washes of the Chalone and Bear Creek drainage systems.

The district is locally significant under National Register Criteria A and C for the period of significance of 1923-1941. This period reflects the years of early park planning and development combined with the efforts of the CCC. The first major road building effort into Bear Gulch was begun in 1924 with funding from local merchants, however it was not until 1933 when a CCC camp was established at Pinnacles that major public road improvements and facility construction

occurred. The CCC abandoned Camp Pinnacles in 1941, ending the period of early park development.

The historic district (identified as a cultural landscape) includes monument roads, the Chalone area, Condor Gulch, the Bear Gulch administration area, and Moses Spring area. Major features within the landscape include the entry road, entrance pylons, rock retaining walls, culverts, tree wells, and early monument buildings. While the Chalone area was found to not retain integrity in the 1999 Chalone CCC Camp Level I Cultural Landscape Inventory, it retains elements which contribute to the larger Pinnacles East Entrance Historic District and is included within its boundaries.

The site continues to fulfill its historic function as the location of park administrative functions, and the majority of character defining features and landscape characteristics contribute to the district's integrity as a designed landscape. These include buildings and structures, circulation, cluster arrangement, land use, natural systems and features, spatial organization, topography, and views and vistas. Small-scale features have lost their integrity and do not contribute as landscape characteristics. As a whole, the cultural landscape of the Pinnacles East Entrance Historic District is in fair condition and retains integrity as a designed landscape. In the following list, features that were constructed during the period of significance contribute to the historic district are while those features that were constructed after the period of significance are non-contributing, even if they are compatible with the historic character of the district.

Circulation

List of Contributing Landscape Features:

- Chalone Creek Road (LCS 267608, Structure # HS16)
- Condor Gulch trailhead
- Eastern Approach Road (Route 146) (LCS 267612, Structure # HS17)
- High Peaks trailhead
- Moses Spring Parking Area
- Moses Spring trailhead
- Stone Stair [LCS: Stone Stairs and Walks, Chief Ranger Residence] (LCS 57535, Structure # HS6)
- Condor Gulch Road (LCS 267617, Structure # HS15)
- Bear Gulch Road (LCS 57542, Structure # HS13)

List of Non-Contributing Landscape Features:

- Bear Gulch administrative area path
- Bear Gulch parking area
- Bear Gulch Trail
- Chalone Creek Bridge

Old Pinnacles trailhead
South Wilderness trailhead
Stone stairway at Building # 10
Two Visitor Center area parking areas
Wood laminate foot bridges

Buildings and Structures

List of Contributing Landscape Features:

Maintenance Office [LCS: Maintenance and Compliance Office] (LCS 57549, Structure # 8)
Visitor (Nature) Center (LCS 7547, Structure # 1)
Conference Room (LCS 57548, Structure # 5)
Bear Gulch Comfort Station (LCS 7391, Structure # 17)
Box culvert with wingwalls (LCS 267602, Structure # HS22)
Chief Ranger Residence [LCS: Chief Ranger's Residence] (LCS 7390, Structure # 2)
Dormitory [LCS: Residence/Dorm "Honeymoon Cabin"] (LCS 57550, Structure # 10)
East Entrance Pylon North (LCS 14031, Structure #HS2)
East Entrance Pylon South (LCS 14032, Structure #HS3)
Garage [LCS: One Car Garage] (LCS 57533, Structure # 23)
Gas and Oil House (LCS 7393, Structure # 200)
Guardwall [LCS: Stone Guard Wall] (LCS 267603, Structure # HS21)
Horse Barn (LCS 7394, Structure # 202)
Maintenance Shop (LCS 57544, Structure # 300)
Masonry Culverts and Headwalls (LCS 267604, Structure # HS20)
Moses Springs Comfort Station [LCS: Moses Spring Comfort Station] (LCS 7392, Structure # 18)
Museum Archives [LCS: Interpretive Laboratory] (LCS 57551, Structure # 13)
Ranger Office (LCS 57547 Structure # 4)
Retaining Walls [Retaining Wall, Chief Ranger Residence] (LCS 57534, Structure # HS5)
Storage Shed (LCS 267605, Structure # 306)
Storage Shed and Warehouse [LCS: Truck and Car Garage] (LCS 57545, Structure # 301)
Superintendent's Residence (LCS 292095, Structure # 19)
Tack Room (LCS 57546, Structure # 302)
Tree Wells [Stone Tree Wells] (LCS 267606, Structure # HS19)

List of Non-Contributing Landscape Features, Managed as a Cultural Resource (LCS):

Chalone Creek Bridge
Checking Station (Building # 25)
Comfort Station (Building # 309 / # 500)

Control Building (# 312)
Powder House (Building # 305)
Residence (Building # 203)
Residence (Buildings # 101 and # 102)
Residence Trailer (Building # 204)
Residence Trailer (Building # 205)
Residence Trailer (Building # 206)
Resource Office (Building # 207)

List of Non-Contributing Landscape Features:

Administrative Office (Building # 14)
Administrative Office (LCS 57553, Structure # 7)
Superintendent's Office (LCS 57552, Structure # 6)
Storage Shed (Building # 517)
Visitor (Nature) Center culverts
Woodshed (Building # 20)
Primary Well (# 315)
Secondary Well (# 313)

Undetermined

Rock Wash Near Chalone Maintenance Area

Small-Scale Features

List of Contributing Landscape Features:

Bear Gulch Curbing [Not on LCS]

List of Non-Contributing Landscape Features:

Signage
Trash bins
Gates
Fire Hydrants
Propane Tanks
Electrical Utilities
Phones
Flag Pole
Cash Box
Bench
Mailbox
Hot Tub
Flammable materials storage box
Gasoline pumps

Archeological Sites

List of Contributing Landscape Features:

Equipment Shed Foundation

High Peaks Trail System

The High Peaks Trail System (trail system) is a component of the National Register eligible Pinnacles East Entrance Historic District. In 2009, the California State Historic Preservation Officer (SHPO) concurred with an amendment to the Pinnacles East Entrance Historic District that expanded the boundary of the historic district to include the trail system.



Road crew cabins in Bear Gulch, 1932. These are the same buildings presently used at park headquarters. NPS photo.

The historic district and the High Peaks Trail System share the same period of significance. The Cultural Landscape Inventory (CLI) for the historic district established a period of significance which began with the work initiated by the first custodian of the monument and ended with the conclusion of the CCC's contribution. This period was defined as extending from 1923 to 1941. Subsequent research has discovered that the CCC continued to make significant contributions to the district and the trail system all the way into the spring of 1942 when the last of the trail work was completed. Subsequently the California SHPO concurred with extending the period of significance one year, from 1941 to 1942, to capture contributions made in 1942 and to realize the actual intent of the original CLI.

The trail system, like the other construction with the Pinnacles East Entrance Historic District, was developed by the National Park Service (NPS) and the Civilian Conservation Corps (CCC) between 1923 and 1942, and it provides recreational access to the finest geologic features of Pinnacles National Monument. Geologic features include rock spires, canyons, and talus caves which are remnants of an ancient volcano. The trail system that navigates through the unique terrain is an outstanding example of the rustic-style of design employed by the NPS during the 1920s and 1930s. A high percentage of the existing trail features date to the historic period and includes Bear Gulch Caves Trail, Moses Spring Trail, High Peaks Trail, High Peaks Cut-Off Trail, Condor Gulch Trail, Tunnel Trail, Wall Trail, Rim Trail, and portions of the Juniper Canyon and Chalone Peak Trails.

The historic structures constructed in support of the High Peaks Trail System were designed in the rustic-style, which emphasized the blending of built works into their setting. The manipulation of natural topography that occurred along the majority of the trail system is still evident including the effort in minimizing the

disturbance to the surrounding landscape. The trail alignment, as established during the historic period, balances the challenges of the steep topography with the desire to allow visitor access to the monument's unique features.

The trail system shares its significance with the Pinnacles East Entrance District, which is locally significant under National Register Criteria A and C with a period of significance that extends from 1923 to 1941. The Pinnacles East Entrance District is locally significant within San Benito and Monterey Counties for its multitude of historic features designed in the rustic style and associated with the establishment of Pinnacles National Monument and the work done there by the CCC. Under Criterion A, the Pinnacles East Entrance District is locally significant for its association with early park development and the CCC. Under Criterion C, the district is significant for its design according to early National Park Service rustic design principles.

In a separate determination of eligibility in 2002, the SHPO concurred with the determination that the Bear Gulch Caves Trail is eligible for the National Register under Criteria A and C. The Bear Gulch Caves Trail is included in the High Peaks Trails System inventory.

The High Peaks Trail System (trail system) is an outstanding example of a rustic-style trail system providing visitor access to many of the finest geologic and natural features of Pinnacles National Monument. The historic character of the High Peaks Trail System is evident in the remaining landscape characteristics and features: circulation, buildings and structures, topography, natural systems and features, spatial organization, and land uses.

The primary landscape features that remain from the period of significance include the Bear Gulch Caves Trail, Moses Spring Trail, High Peaks Trail, Condor

Gulch Trail, Tunnel Trail, Wall Trail, Rim Trail, and portions of the Juniper Canyon and Chalone Peak trails.

The High Peaks Trail System and associated contributing features within this district retain all seven aspects of integrity. The High Peaks Trail System is in good condition. Though there is clear evidence of disturbances due to visitor use of the trail system, the maintenance staff has had a history of sensitively stabilizing these impacts through routine and periodic maintenance.

The North Chalone Peak Fire Lookout Tower, located within the High Peaks Trail System, does not contribute to the East Entrance Historic District. The lookout was constructed in 1952, after the period of significance of the historic district, 1923-1942. The lookout itself is individually eligible for the National Register under Criterion A for its association with California forestry and fire protection, and Criterion C as the oldest example of the revised 809R plan. The year of significance is 1952.

In the following list, features that were constructed during the period of significance contribute to the historic district are while those features that were constructed after the period of significance are non-contributing, even if they are compatible with the historic character of the trail system. See the High Peaks Trail System Cultural Landscapes Inventory for a more detailed analysis of contributing and non-contributing features.

Circulation

List of Contributing Landscape Features:

- Bear Gulch Caves Trail (LCS 57540, Structure # HS11)
- Moses Spring Trail (LCS 57539, Structure # HS10)
- High Peaks Trail (LCS 57536, Structure # HS7)
- Condor Gulch Trail (LCS 57538, Structure # HS9)
- Tunnel Trail (LCS 57537, Structure # HS8)
- Juniper Canyon Trail (Upper Segment) (LCS 791347, Structure # tbd)
- Wall Trail (LCS 791355, Structure # tbd)
- Rim Trail (LCS 791364, Structure # tbd)
- Chalone Peak Trail [LCS: North Chalone Peak Trail] (LCS 57543, Structure # HS14)
- High Peaks Cut-Off Trail [LCS: High Peaks Cutoff Trail] (LCS 791375, Structure # tbd)
- Condor Gulch Overlook

List of Non-Contributing Landscape Features:

- Chalone Peak Trail - Fire Road Segment
- Moses Spring Trail Realignment
- Cave Access Trail
- Rock Climbing Access Trailheads

Buildings and Structures

List of Contributing Landscape Features:

- Tunnels (3)
- Bridges (6)
- Causeways (2)
- Retaining Walls (351)
- Parapet Walls
- Steps (47)
- Check Steps (8)
- Check Dams (Water Bars) (2)
- Open Ditches (Open Culverts) (5)
- Spillway (1)
- Bear Gulch Dam (LCS 7395, Structure # HS1)
- High Peaks Comfort Station (LCS 23050, Structure # 400)
- Chalone Peak Comfort Station [LCS: North Chalone Peak Comfort Station] (LCS 23051, Structure # 403)
- Switchback Retaining Walls
- Handrails (15)
- Cut Stone Bench

List of Non-Contributing Landscape Features:

- Bridges (2)
- Retaining Walls (73)
- Steps (15)
- Check Steps (176)
- Check Dams (Water Bars) (22)
- Open Ditches (Open Culverts) (31)
- Culvert (1)
- Diversion Ditch (1)
- Terraces (5)
- North Chalone Peak Fire Lookout Tower (LCS 444168, Structure # 402)
(Though the lookout does not contribute to the East Entrance Historic District, the lookout is individually eligible for the National Register (see above narrative)).
- Interpretive and Wayfinding Signs
- Wayfinding Arrows
- Gates (7)
- Temporary Fences
- Wood Bench

Topography

List of Contributing Landscape Features:

- Switchbacks (64)
- Tread Cuts (212)
- Rip Rap Trail Tread (1)

List of Non-Contributing Landscape Features:

- Switchbacks (12)
- Tread Cuts (7)
- Feature: Rip Rap Trail Tread (1)

Ben Bacon Ranch Historic District

The Ben Bacon Ranch Historic District is a cultural landscape that was determined eligible for the National Register of Historic Places by the California state historic preservation officer.

The 331-acre Ben Bacon Ranch Historic District (historic district) is a vernacular landscape that represents the pre-irrigation homestead/agricultural landscape of central California. The existing buildings, structures, and associated landscape characteristics date from the state's early agriculture period. The historic district is the core area of the larger 1,967-acre Pinnacles Ranch, which was acquired and added to Pinnacles National Monument in 2006. Pinnacles Ranch roughly corresponds to the lands acquired by homesteader, Ben Bacon, during the period of significance. The Ben Bacon Ranch Historic District includes the northern portion of the Sandy Creek Valley floor, where two historic homesteads and their associated agricultural features are located.

The Ben Bacon Ranch Historic District is locally significant under Criterion A for its association with early subsistence and small-scale commercial agriculture in California. The period of significance starts in 1865, when the first homesteaders settled along Sandy Creek, and ends in 1941, when the last of the original homesteading generation died and their way of life ended. After the period of significance, the local agricultural economy (including the Ben Bacon Ranch) stagnated, isolating Bear Valley from the larger patterns of development which characterized agricultural communities throughout most of the rest of California. The historic district retains its integrity as a pre-irrigation homestead in the San Benito County area. Also retained are the landscape characteristics associated with agriculture prior to the development and widespread use of irrigation systems for intensive agricultural production.

The historic district is associated with local settlers Ben Bacon, George Butterfield, Elizabeth Bacon, and Gustav Lange. Ben Bacon acquired all of the land within the historic district during the period of significance and used the valley to cultivate crops and raise livestock. The buildings and features retained at the Bacon and Butterfield clusters convey the historical significance of the pre-irrigation agricultural developments in the region through the design of these core homestead clusters. Also evident is the relationship of the homesteads to the surrounding landscape, as defined by existing historic road alignments, fence lines and vegetation. Much of the historic road system is retained and conveys the historic relationships between the homesteads, croplands and pasture, other



CCC enrollees at work, 1935. NPS photo.

homesteads, and the larger region. The existing grasslands that dominate the setting reflect the broad open pasture and cropland character established during the historic period. These grasslands are punctuated by valley oak stands and riparian vegetation that have retained their historic locations. Overall, the character of the vegetation, particularly the open grasslands, riparian corridors, oak stands, and planted trees around the homesteads dominate the landscape and convey the historic character established during the period of significance by a combination of cultivation and grazing. The historic buildings and structures that remain still convey a strong feeling of the historic character of this agricultural landscape. The landscape appears today much as it did during the period of significance, as evidenced by historic photographs.

While the historic district's buildings, structures, and planted trees have been neglected since the period of significance, this has not affected the historical integrity of the district. The overall landscape is in fair condition with stabilization needed for historic structures.

Circulation

List of Contributing Landscape Features:

- Butterfield road (LCS 791273, Structure # tbd)
- Bacon road (LCS 791210, Structure # tbd)

List of Non-Contributing Landscape Features:

- Sevenman Canyon Road (Contemporary)
- Airstrip Road

Buildings and Structures

List of Contributing Landscape Features:

- Bacon house (LCS 791222, Structure # tbd)
- Bacon barn (LCS 791255, Structure # tbd)



Photos (top to bottom): 1. Original fire lookout on North Chalone Peak, constructed by CCC in 1935 (destroyed by fire in 1951). 2. Present fire lookout on North Chalone Peak, constructed by California Dept. of Forestry in 1952. 3. May 2008 view of North Chalone Peak fire lookout. NPS photos.

- Bacon pump house (LCS 791241, Structure # tbd)
- Bacon garage [storage building] (LCS 791338, Structure # tbd)
- Butterfield barn (LCS 791284, Structure # tbd)
- Butterfield secondary barn [LCS: Butterfield Secondary Barn/Granary] (LCS 791322, Structure # tbd)
- Butterfield windmill/well (LCS 791330, Structure # tbd)
- Wood shed (Bacon)

List of Non-Contributing Landscape Features:

- Concrete pad (Bacon)
- Carport (Bacon)
- Septic tank (Bacon)
- Three-Rail Fence (Bacon)
- Shade shed (Bacon)
- Fishing pond (Bacon)
- Vehicle bridge (Bacon)
- Water tanks (2) (Butterfield)
- Water trough (Butterfield)
- Wooden box (Butterfield)
- Well pump (Butterfield)
- Mobile home (Kingman)
- Fences, gates, and corrals/paddocks

McCabe Canyon

McCabe Canyon lies outside the boundaries of the Ben Bacon Ranch historic district but is historically associated with it. The lower half of the canyon was homesteaded by Ben Bacon’s brother Oliver, whose farmstead was located along Sandy Creek opposite the mouth of McCabe Canyon but no longer exists. Oliver Bacon never introduced any improvements into McCabe Canyon except for a water supply system, which conveyed water from a redwood-lined spring box through an underground steel pipe to a concrete livestock watering trough and nearby spigot for domestic use. All of these features are still extant, and the livestock trough has been recorded as an isolated archeological feature (State Primary Number P-35-000319).

Also recorded near the mouth of McCabe Canyon is a lithic scatter (CA-SBN-222) associated with pre-historic occupation of the area by the Chalon Indians, a subgroup of the Ohlone and closely related to the present day Amah Mutsun.

Just within the mouth of McCabe Canyon is the residence of Mark Francis, who is a direct descendent of the original Bacon family. This house was introduced to the site in the 1950s and has no designated significance. Mark Francis will continue to occupy the residence under a life-lease agreement arranged when he sold the property to the National Park Service in 2000.

Above the Mark Francis house, toward the middle of the canyon is an extensive bed of spring-watered white-root sedge (*Carex barbara*), growing beneath an overstory of valley oak. Above this is an equally extensive bed of deergrass (*Muhlenbergia rigens*). Both plants were, and continue to be, valued by California Indian people as fiber sources utilized in the making of baskets. Although no definitive archeological or ethnographic evidence has yet been found demonstrating the use and occupation of this site by California Indians, the extent of these ethnobotanically valuable resources, the proximity of abundant water and food sources, and the presence of CA-SBN-222 at the bottom of the canyon all argue strongly that this is a landscape with ethnographic significance. A reconnaissance level archeological survey was conducted of the canyon (Gavett 2008) and more intensive survey work was conducted by UC Berkeley in 2011.

West Side Historic Archeological Districts (Proposed)

Two historic archeological districts are being considered for the west side of the monument to encompass locally-important mining and homesteading sites associated with the period from approximately 1870 to 1933. The sites within this potential district include the Lyon's Homestead (CA-SBN-124H) and the Melville Mines. These sites have been partially documented and researched but will require further study and more-detailed field surveys. One of the proposed districts would begin at the west entrance of the monument and extend north to the mouth of Jawbone Canyon where the canyon is crossed by the monument entrance road. To the west and north, it would be bounded by the entrance road, while its east boundary would lie along the bottom of Jawbone Canyon. At its southwest corner, the district boundary would be adjusted eastward to exclude a proposed administrative center just west of the Lyon's Homestead. A second district would include a small area north of the entrance road, adjacent to the overflow parking area, where the Melville Mines are concentrated.

Values, Traditions, and Practices of Traditionally Associated Peoples (Ethnographic Resources)

Pinnacles possesses cultural resources important to a diverse range of peoples traditionally associated with the monument and its surrounding environment. These include native Ohlonean descendants of the Mutsun and Chalon peoples as well as members of the local community, many of whom are descended directly from families that homesteaded in the mid-nineteenth century. The monument also likely possesses resources significant to the Hispanic community as well.

The Amah Mutsun Tribal Band, Chalon Nation, and other California Indian peoples recognize culturally-significant ethnobotanical resources in the monument. In some cases, vegetation patterns exhibit evidence of possible anthropogenic manipulation from prior to Euro-American settlement. Though not yet demonstrated conclusively, these patterns may represent a tangible legacy of landscape management and other cultural activities associated with the ancestors of the present Ohlone generation. Other important culturally significant information associated with the Ohlone of the Pinnacles region is preserved in the notes of Smithsonian anthropologist/linguist J.P. Harrington, who conducted extensive interviews during the early twentieth century with one of the last surviving native speakers of the Mutsun language, Ascencion Solarsano. Some of Solarsano's direct descendants are still living in the area and working actively with NPS staff to preserve and further the Mutsun legacy at Pinnacles.

The local ranching community also possesses a strong historic relationship with Pinnacles. The ancestors of many of these families came to the area during the mid-nineteenth century, shortly after California's accession to the United States, and established the first American homesteads in the region. Members of this community were responsible for petitioning the federal government to establish the monument in 1908 and have been employed on its staff at nearly every level, from superintendent to maintenance laborer, at various times since. For this rural community, the Pinnacles represent both a natural landmark which defines their physical geography as well as a political achievement and source of local pride and cultural identity.

Links to the Spanish-Era at Pinnacles have not been well studied and are currently underappreciated. Nonetheless, it is known that this community is and has long been important to the monument. Pinnacles lies within the region of Upper California colonized by the Spanish Empire during the mid-eighteenth century and is only fifty miles—or an easy two-day journey by horse—from the capital of the Spanish colony at Monterey. The Mission of Nuestra Señora de la Soledad, established by the Franciscan fathers in 1791, was located at the western foot of the mountains rising up to the Pinnacles, scarcely eight miles from the present monument boundary. The present town of Soledad, situated not far from the abandoned mission, members of its population, and populations of other Salinas Valley towns may retain potentially significant ethnographic ties with pre-Anglo California and the Pinnacles.

Contemporary Tribal Interests

For thousands of years, Chalon, Mutsun, Chapana, and Pagsin people (called Ohlone, as a grouping, by others), lived in this area. Native peoples still live in the region and members of the Amah Mutsun and Chalon tribes are working with monument staff to expand knowledge of their relationship with this land—its plants, animals, and waters—and how their ancestors managed it for centuries.

In January 2007, an interdisciplinary group of regional experts consisting of botanists, archeologists, fire managers, resource managers and Amah Mutsun Tribal Band representatives and Western Mono basketry practitioners convened for a field trip to McCabe Canyon. The group provided the following input:

- The deergrass stand in McCabe Canyon is noteworthy due to its size and rarity.
- The stand and surrounding oaks may have been managed by Native Americans using fire.
- The stand appeared overly mature with decadent foliage and requires active management to maintain health and abundance.

Subsequent collaboration led to a successful 2009 grant in “Cooperative Habitat Restoration of a California Grassland” with the University of California, Santa Cruz and the Amah Mutsun Tribal Band with Western Mono basketry practitioners to restore habitat quality, reintroduce traditional management techniques, provide learning opportunities to tribal people, monument staff and the public and evaluate flora and faunal response. Building on this work, the monument was successful in garnering additional partners for an in-depth study “Exploring the Traditional Use of Fire in the Coastal Mountains of Central California.” The project has brought together a team of ecologists, archeologists, environmental historians, indigenous peoples, and land managers within a research and educational framework. Partners include the University of California at Berkeley, University of California at Santa Cruz, the San Francisco Estuary Institute, California State Parks, Bureau of Land Management and the Amah Mutsun Tribal Band.

Pinnacles is also learning from their Argentinian partners, where Andean condor reintroduction efforts involve a cultural component with local communities and indigenous peoples. Pinnacles is striving to follow this example and incorporate tribal interests in California condor recovery. The monument is working with requesting tribes to acquire USFWS permits for tribal use of condor feathers. The Amah Mutsun Tribal Band has been involved with juvenile condor release events since 2007 and has taken a strong interest in the

progress and challenges of the recovery program. A Chumash tribal representative has also inquired about the Pinnacles condor flock.

The Amah Mutsun Tribal Band resumed tribal dance ceremonies at Pinnacles in 2009 and has since “rediscovered” survivors of the Chalon people who came back to Pinnacles and the region in 2011. This homecoming was the result of ethnographic work of Dr. Charles Ettner from California State University at Fresno, using California mission records.

Museum Collections

The monument maintains a significant collection of historical, archeological, and natural history specimens. The *Collections Management Report* (2011) reports that there are over 156,000 objects in the collection. The cultural objects include 66 archeology, 15 history and 76,980 archival items. The 40,292 natural history items are composed primarily of insect and herbarium specimens, with small numbers of mammals, birds, reptiles, amphibians, and rocks. A Curator of Record was assigned to the monument in 2008 from San Francisco Maritime NHP, providing needed guidance in basic museum operations. In 2010, the Pinnacles Scope of Collections was updated.

Since 2007, cataloging the backlog of archival documents, maps, photographs and biological accessions has been completed. More remains to be finished and each year more backlog is accumulated since the monument does not have a base-funded museum archive program. Many of the herbarium specimens have been photographed, and a project is underway to make these and other biological specimens available to the public via a digital archive.

Amah Mutsun Tribal Chair Valentin Lopez (left), and AMTB Ceremonial Dance Leader, Marvin Marine, offer a song in honor of the release of condors into the wild. Photo by Chuck Striplen.



A 2007 renovation to the museum building interior alleviated problems with pest and environmental control. The space is of adequate size for the current collection but with limited room for additional objects and workspace. Due to limited space, limited professional oversight, sensitive riparian habitat, and fire-prone vegetation in the vicinity of the facility, moving the museum collections to a more suitable location within the monument is an important consideration in future planning.

Pinnacles is working with the San Francisco Bay Area Network to be included in scoping additional museum specimen storage for objects not needing immediate accessibility to be managed by professional curatorial staff in the Bay Area.

Park Operations

RESOURCE PROTECTION AND VISITOR SERVICES

The Resource Protection and Visitor Services Division provides law enforcement services (including all emergency services such as search and rescue and emergency medicine as well as planning for these); education, interpretation and outreach and coordination of these; and fee collection. Currently, the division consists of nine FTE, eight of which are permanent full time, with another staff person who is permanent less than full time. The remainder of the staff are filled by term, seasonal, and student intern/volunteer positions. The division also provides for visitor and employee safety, and manages the structural fire prevention program. Staff from the Resource Protection and Visitor Services Division are the first and sometimes the only contact visitors have with monument staff. They explain why the monument is here as well as why it should be preserved. They answer visitors' questions and give informative programs. The staff also inform the public of the rules and regulations to protect resources. The revenue from fees provide for improvements to exhibits, monument buildings and trails, and any resources that are disturbed.

RESEARCH AND RESOURCE MANAGEMENT

The Research and Resource Management Division manages the monument's natural and cultural resources and is responsible for planning and implementing short- and long-term projects to manage, monitor and/or enhance these resources.

FACILITIES MANAGEMENT (MAINTENANCE)

The Facilities Management Division manages the day-to-day maintenance needs of the monument, for both employee and visitor facilities. This division is responsible for planning, formulating, implementing, and

tracking maintenance projects, as well as for developing long range planning budgets for Cyclic Maintenance Repair/Rehabilitation and Construction Programs.

ADMINISTRATION

The Administration Division manages and provides general oversight for all monument administrative programs including budget, finance, payroll, Government Performance and Results Act reporting requirements, human resources, uniforms, property, travel, safety, communications, contracting, procurement and housing.

SUPERINTENDENT

The superintendent provides on-site management, planning, program direction and administers operation of resource and visitor protection, interpretation, maintenance, cultural and natural resource management. The superintendent oversees the overall operation of the monument by setting goals and priorities and establishing guidelines. One person fills the superintendent's position.

EXISTING PERMANENT (BASE-FUNDED) STAFFING:

- Division of Interpretation = 6.66
- Division of Law Enforcement & Protection = 5.28
- Division of Maintenance = 12.07
- Division of Resource Management = 8.35
- Division of Administration = 6.02
- Total = 38.38
- In addition to base-funded staff, seasonal employees are hired each year with project funds. Other staffing needs are met through term employees, student interns, and volunteers.

The current operating budget for Pinnacles National Monument is \$3,600,000.

Law enforcement issues and concerns. During a ten-year period, from 1997-2007, there were approximately 400 law enforcement offenses. The biggest issues are theft and vandalism.

Emergency Services. During a ten-year period, from 1997-2007, there were a total of 58 search and rescue cases, an average of six per year. There were also a total of 127 visitors that were assisted by search and rescue operations staff. Most incidents were from hiking, followed by climbing. There were 74 cases, not including minor cases (19), that required emergency medical services – an average of seven per year.

Carbon Footprint

Pinnacles National Monument is a participant in the Climate Friendly Parks program and completed a climate action plan in 2010. This program enables the NPS to educate its staff about climate change issues, assess the monument's contribution to greenhouse gas (GHG) emissions, create short- and longterm strategies for reducing emissions, determine potential effects of climate change on monument resources, and develop skills and strategies for communicating these effects to the public. The monument's carbon emissions were analyzed in 2008, based on 2007 data. The Climate Leadership in Parks (CLIP) tool, software developed jointly by the Environmental Protection Agency and the NPS, was used to calculate the monument's greenhouse gas emissions. Calculations included the amount of electricity purchased, sewage pumped, waste sent to the landfill, and fuels consumed. Motor vehicle data was derived from a combination of 2007 road counter data and visitor use surveys.

GREENHOUSE GAS EMISSIONS

GHG emissions result from the combustion of fossil fuels for transportation and energy (e.g., boilers, electricity generation), the decomposition of waste and other organic matter, and the volatilization or release of gases from various other sources (e.g., fertilizers and refrigerants). At Pinnacles National Monument, the main sources of energy for monument operations are propane and purchased electricity.

In 2007, GHG emissions within Pinnacles National Monument totaled 540 metric tons of carbon dioxide equivalent (MTCO₂E). This includes emissions from monument and concessioner operations and visitor activities, including vehicle use within the monument. For perspective, a typical single family home in the U.S. produces approximately 12 MTCO₂ per year. Thus, the combined emissions from monument and concessioner operations and visitor activities within the monument are roughly equivalent to the emissions from the energy use of 46 households each year.

Based on the 2007 data, the largest emission sector for Pinnacles National Monument is transportation, totaling 370 MTCO₂E. Visitor vehicles driving within monument boundaries generate about 68.5% of the transportation emissions. The energy sector (purchased electricity and stationary combustion) accounts for approximately 16.5%, and waste (land-filled waste and wastewater) accounts for approximately 15% of total gGHG emissions.

Although the monument's share of carbon emissions may be negligible when compared to state and regional

emissions, the cumulative nature of countless small carbon sources and the expectation of National Park Service leadership on environmental issues justify significant actions to mitigate emissions from monument activities.

Regional Socioeconomics

Location

Pinnacles National Monument is located in central California, approximately 40 miles inland from the Pacific Ocean and about 80 miles south of the San Francisco Bay Area.

The monument lies primarily within San Benito County, although some southwestern portions fall within Monterey County. The City of Hollister, the San Benito County seat, is 35 miles to the north of the Monument on Highway 25; Soledad, in Monterey County is 8.5 miles to the west (NPS 2010). Local population centers include Salinas, Soledad, Greenfield, and King City, along with smaller towns, on US 101 in Monterey County. To the east, SR 25 connects Hollister with the smaller communities of Paicines and Bitterwater in the less populous San Benito County. The nearest major urban center is San Jose, with a population of approximately 945,942.

The land surrounding the monument in Monterey and San Benito Counties is primarily used for ranching and agriculture. The monument is located inland in the Central Coast Region of California -- a region noted for its scenic coastline and numerous recreational opportunities in one of the fastest growing regions in the state. Monument visitation has averaged 170,000 people annually over the past 20 years and 154,000 over the past decade (NPS Stats 2009, NPS 2010).

The communities in these counties serve as gateways to the monument, providing a variety of goods and services for monument visitors.

Demographics

The 2010 Monterey County population was 415,057, while San Benito County had a population of 55,269. The San Benito County population increased 3.8% between 2000 and 2010, while Monterey County grew 3.3%. For comparison, California as a whole grew by 10% in the same time period.

Monterey County has been projected to increase 31.7% between 2000 and 2030. San Benito County has been projected to nearly double, with a 94.1% increase by 2030, about twice as much as the average growth across California over the same 30 year period. The

two counties combined, however, will grow at a slightly slower pace (39%) than the state average (45.4%).

A complete breakdown of population by race/ethnicity is presented in the table below. Whites are the largest racial group in the affected area (56.5% of the total population). 55.5% of the total population identified themselves as Hispanic or Latino, significantly higher than the state average of 32.4%, and up from 47.5% in 2000. The percentages of Asians (5.7%) and African Americans (2.8%) are each about half of the state averages. The African American population showed a decline between 2000 and 2010.

Income

In 2005, Monterey County had a per capita personal income (PCPI) of \$35,775, slightly below the California average of \$36,936 (See table 27). San Benito County had a lower PCPI at \$30,862, 90% of the national average.

The total personal income for the combined counties was more than \$16 billion in 2005 (See table 28). This figure represents only a small percentage of the total personal income for California.

Employment

Major components of the local economy include agriculture, government, trade, and services. Commercial services including gas, groceries, restaurants, motels, and RV parks are available in nearby communities in close proximity to the monument. The combined counties had more than 187,650 jobs in 2000. Education, health, social services, agriculture, trade, entertainment, and recreational services were the sectors employing the most workers in the combined counties.

Due to the prevalence of seasonal jobs in agriculture and tourism, unemployment remains higher in the combined counties than the state averages.

San Benito County's primary industries in 2006 were manufacturing, agriculture, and government. The economic sectors that are produced the most new jobs in San Benito County were construction, wholesale and retail trade, and leisure services. (California Department of Transportation 2007).

In Monterey County, farming is an important part of the economy, accounting for 24 percent of the workforce and \$3.4 billion in total crop value in 2006. The fastest growing sectors include construction, government, healthcare, and education sectors, while manufacturing has experienced a sharp decline. While farm jobs have also declined a slight amount

in recent years, this sector is expected to hold steady over the next twenty years. (California Department of Transportation 2007).

Approximately 9% of the jobs in San Benito County and 12.3% in Monterey County were in leisure services. This sector is projected to decrease to 8.29% and 11.8%, respectively, by 2030. This is mostly due to expected gains in wholesale/retail trade and government jobs in San Benito County and healthcare, professional, and government jobs in Monterey County (California Department of Transportation 2007).

Poverty

In 2004, the percentages of residents living in poverty were 12.9 in Monterey County and 8.8 in San Benito County. Both were lower than the state average of 13.2%. 55,552 residents of the combined counties were living in poverty in 2004 (United States Census Bureau 2006).

Regional Tourism

Total travel spending in Monterey County for 2005 was \$1.9 billion compared with \$88.5 billion for the State of California. San Benito County saw total travel spending of \$77 million for the same period. The combined travel spending for Monterey and San Benito Counties accounted for about 2.3% of the total travel spending for California in 2005 (Dean Runyan and Associates 2007).

For the combined counties, the tourism industry provided a total of 23,600 jobs in 2005. Total direct employment increased slightly (0.3%) from 1992 to 2005 in San Benito County, while Monterey County saw an increase of 1.3% (Dean Runyan and Associates 2007).

Visitor Spending

Pinnacles National Monument hosted 171,112 recreational visits in Fiscal Year 2009. Visitors traveling to Pinnacles National Monument spent a total of about \$3.2 million in 2009. Local visitors within a 50-mile radius around the monument, including all of San Benito County, most of Monterey County, and small portions of five other counties spent about \$500,000 while non-local visitors spent about \$2.7 million. These figures include businesses selling goods and services directly to monument visitors as well as secondary effects seen as visitor spending circulates through the local economy. Non-local visitor spending helped to support approximately 31 full and part-time jobs and added \$1.9 million to the local economy in profits, incomes, and taxes (National Park Service 2009).

TABLE 24: POPULATION

Counties	2000	2010	% Change 2000-2010
Monterey County, CA	401,764	415,057	3.3%
San Benito County, CA	53,234	55,269	3.8%
Combined Counties	454,998	470,326	3.4%
California	33,871,648	37,253,956	10.0%

Source: United States Census Bureau, 2010

TABLE 25: POPULATION PROJECTIONS

Counties	2000	2020	2030	% change 2000-2030
Monterey County, CA	401,764	476,642	529,145	31.7%
San Benito County, CA	53,234	83,792	103,340	94.1%
Combined Counties	454,998	560,434	632,485	39%
California	33,871,653	44,135,923	49,240,891	45.4%

Sources: United States Census Bureau, 2000, State of California, Department of Finance, July 2007

TABLE 26: RACE/ETHNICITY

Race (2010)	Monterey County		San Benito County		Combined Counties	
	Number	%	Number	%	Number	%
White	230,717	55.6	35,181	63.7	265,898	56.5
Black or African American	12,785	3.1	483	0.9	13,268	2.8
American Indian and Native Alaskan	5,464	1.3	895	1.6	6,359	1.4
Asian	25,258	6.1	1,443	2.6	26,701	5.7
Native Hawaiian and other Pacific Islander	2,071	0.5	94	.2	2,165	0.4
Some other race	117,405	28.3	14,471	26.2	131,876	28.0
Two or more races	21,357	5.1	2,702	4.9	24,059	5.1
Total Population	415,057	100.0	55,269	100.0	470,326	100.0
Hispanic or Latino*	230,003	55.4	31,186	56.4	261,189	55.5

Source: United States Census Bureau, 2010

TABLE 27: PER CAPITA PERSONAL INCOME

Area	1995	2005	% of State Average, 2005	State Rank, 2005
Monterey County	\$24,536	\$35,775	97	18th out of 58
San Benito County	\$21,501	\$30,862	84	26th out of 58
California	\$24,161	\$37,283	100	
United States	\$23,076	\$34,685		

Source: Bureau of Economic Analysis, U.S. Department of Commerce, 2007

TABLE 28: TOTAL PERSONAL INCOME

Area	1995 (Thousands)	2005 (Thousands)	% total state for 2005
Monterey County	8,772,120	14,751,660	1.1%
San Benito County	910, 240	1,728,453	0.1%
Combined Counties	9,682,360	16,480,113	1.22%
California	765,805,583	1,347,942,750	100.0%

Source: Bureau of Economic Analysis, U.S. Department of Commerce, 2007

TABLE 29: EMPLOYMENT BY INDUSTRY

Industry	Monterey County	% of Total	San Benito County	% of Total	Combined Counties	% of Total
Educational, health, and social services	29,891	18.2	3,855	16.3	33,746	18.0
Agriculture, forestry, fishing and hunting, and mining	20,298	12.4	1,512	6.4	21,810	11.6
Retail Trade	18,395	11.2	3,055	12.9	21,450	11.4
Arts, entertainment, recreation, accommodation and food services	16,965	10.3	1,478	6.2	18,443	9.8
Professional, scientific, management, administrative, and waste management services	14,674	8.9	1,727	7.3	16,401	8.7
Manufacturing	9,284	5.7	3,389	14.3	12,673	6.8
Construction	10,443	6.4	2,105	8.9	12,548	6.7
Wholesale Trade	9,781	6	1,272	5.4	11,053	5.9
Public administration	8,998	5.5	1,359	5.7	10,357	5.5
Finance, insurance, real estate, and rental and leasing	8,116	4.9	1,053	4.4	9,169	4.9
Other services (except public administration)	8,058	4.9	1,229	5.2	9,287	4.9
Transportation and warehousing, and utilities	5,341	3.3	1,060	4.5	6,401	3.4
Information	3,743	2.3	569	2.4	4,312	2.3
Total	163,987	100	23,663	100	187,650	100

Source: United States Census Bureau, 2000

TABLE 30: TRAVEL SPENDING AND EARNINGS

2005	Total Travel Spending (Millions)	Employment Jobs	Earnings (Millions)	Tax Receipts (Millions)
Monterey County	1,948.6	22,680	819.0	125.3
San Benito County	77.0	920	24.6	3.8
Combined Counties	1977	23,600	32.0	4.3
California	88,488.6	910,010	27,400.4	5,290.1

Source: Dean Runyan and Associates, 2007

Regional Land Use

County Zoning

San Benito County: Most of San Benito County is zoned Agricultural Rangeland, including all lands within an 18 mile radius of the monument. Allowed uses in this zone include grazing, agricultural, and accessory uses (barns, stables, etc.), along with a single family dwelling. The minimum building site area is 40 acres. Conditional uses, where a permit is required, include commercial feed lots, private camps, guest-houses, and bed and breakfasts, among others (San Benito County 2007).

Monterey County: Lands in Monterey County that border the monument are zoned Permanent Grazing. Allowable uses include agricultural uses and accessories, including up to three homes. Conditional uses include dairies, airports, commercial wind energy, farm worker housing, bed and breakfasts, and oil and gas exploration, among others. The minimum building site is 40 acres. Some portions of SR 146 leading into and up to the monument, along with lands surrounding and following US 101 at a distance of about five miles from the monument, are zoned Farmlands. Allowable uses and minimum building site size are identical to Permanent Grazing zoned lands. Conditional uses include those specified under Permanent Grazing, as well as public facilities such as parks and schools and large gatherings such as festivals (California Land Use Planning Information Network 2007).

Williamson Act

The Williamson Act creates an arrangement whereby private landowners contract with counties to voluntarily restrict land to agricultural and open-space uses. In return, restricted parcels are assessed for property tax purposes at a rate consistent with their actual use, rather than their potential market value. The state compensates counties for the decrease in tax revenue (Department of Conservation 2007).

Most of the lands bordering the monument are enrolled in the Williamson Act program. A notable exception is the land immediately adjacent to SR 146 on the west side of the monument. On the east side, much of SR 25 as it approaches the monument from either direction is bordered by Williamson Act-enrolled lands classified as “Prime.”

As of the writing of this document, the future of the Williamson Act is uncertain due to state budget concerns. Because of this, many other efforts are underway to promote open working landscapes.

Future Development

Future development around the monument is limited by the topography, the Williamson Act contracts and county zoning. Although both counties are projected to grow dramatically in population, development associated with this growth is not expected proximate to the monument. In San Benito County, urban growth projections based on demand, job accessibility, current land use, neighboring uses, and regulatory variables show virtually no growth in development south of Hollister through 2050. More significant growth is anticipated along US 101 in Monterey County, but not along SR 146 leading into the monument. The projections show a continuous corridor of development in 2050 from Chualar, through Gonzales, to Soledad. Current urban densities in Soledad are expected to expand nearly a mile in each direction by 2050 (California Legacy Project 2002; Landis 2003).

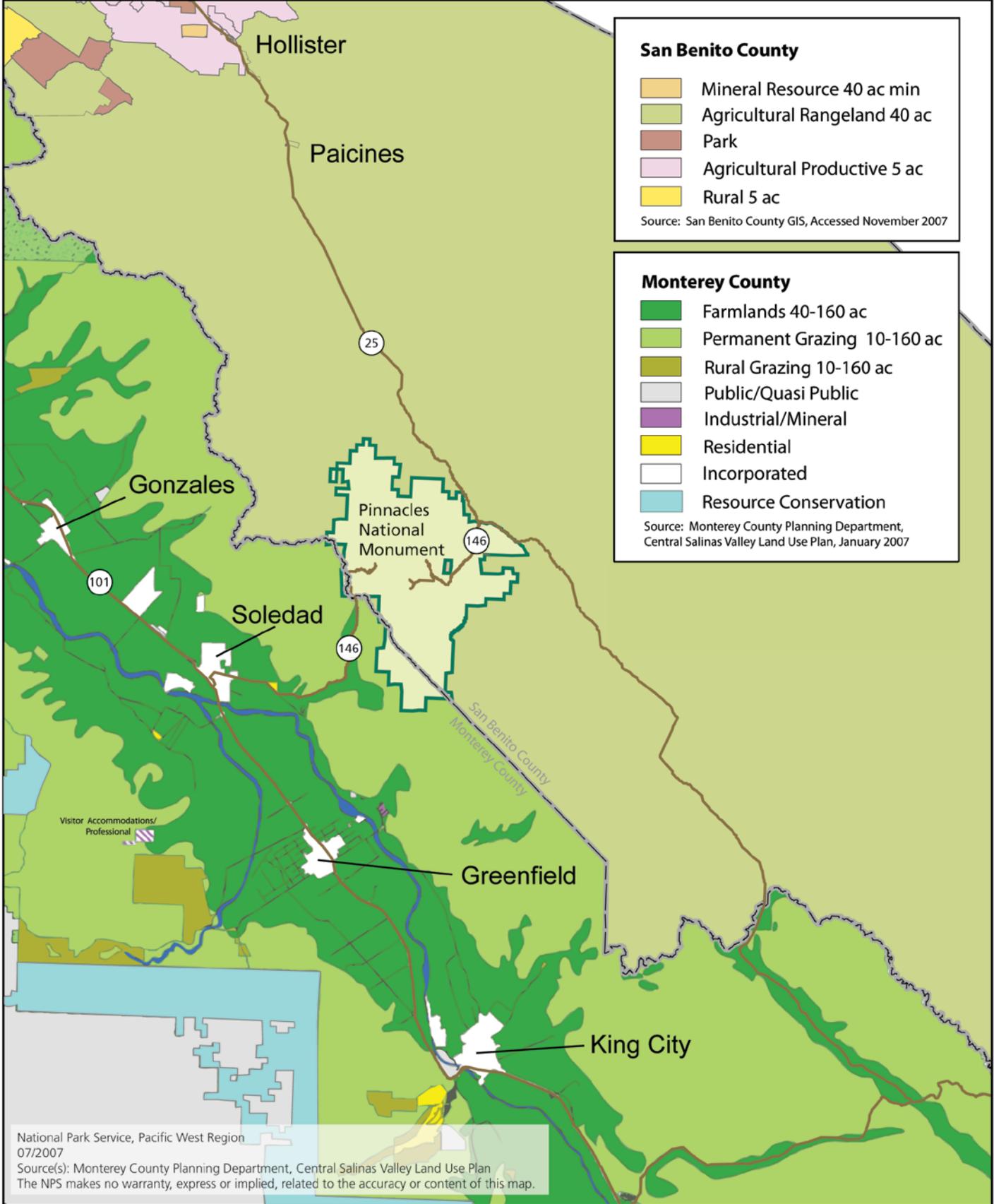
PRIVATE LANDS WITHIN THE MONUMENT BOUNDARY

There are two privately-owned parcels within the legislative boundary of the monument. One parcel is an 80-acre (32 hectare) private inholding fully surrounded by monument lands and abutting the western boundary of McCabe Canyon. The other is a 714-acre (289 hectare) parcel on the eastern boundary of the monument with direct access from Highway 25. The parcel contains an occupied cabin and typical ranch outbuildings and several dirt roads that connected the parcel to homesteads in Bear Valley (NPS 2010). This private inholding is accessed by an easement along the south eastern boundary of the bottomlands along Highway 25.

County Zoning

Pinnacles National Monument

National Park Service
U.S. Department of the Interior

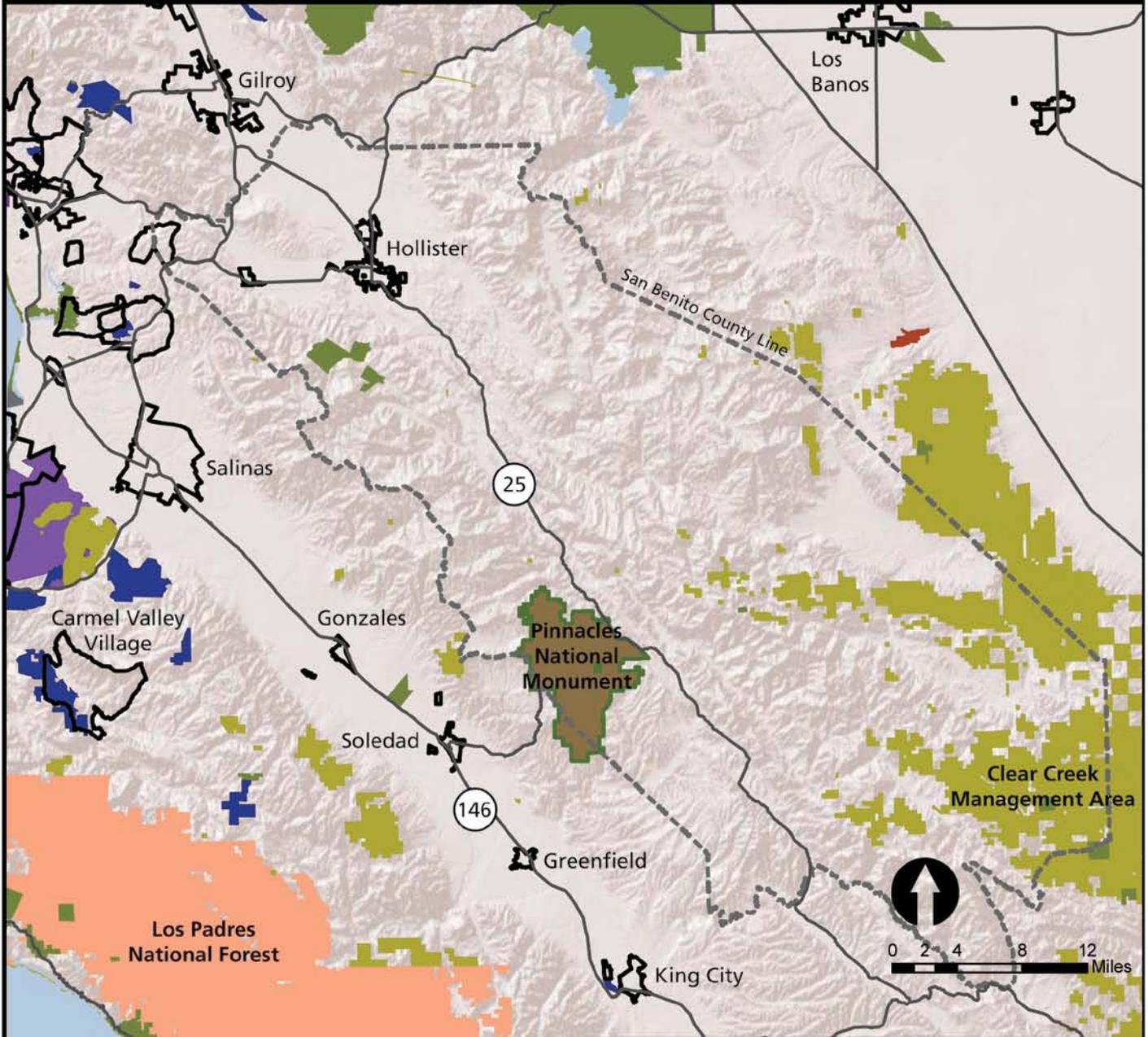


National Park Service, Pacific West Region
07/2007
Source(s): Monterey County Planning Department, Central Salinas Valley Land Use Plan
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Regional Landownership

Pinnacles National Monument

National Park Service
U.S. Department of the Interior



	Major Roads		
	County Line		
	Pinnacles National Monument Boundary		
	Cities		
AGENCY Landownership			
	Bureau of Land Management		Other Federal
	Bureau of Reclamation		State
	Local Government		US Fish and Wildlife
	Military		US Forest Service
	National Park Service		Unclassified/ Other

National Park Service, Pacific West Region
08/2011
Source(s): BLM Land Status Database
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