One sees evidence of past logging in many areas of the VCNP.

species, with roughly another 100 species expected to be present but not yet fully documented. Unusual species found so far include bog birch and short-awn mountain rice-grass, both about 100 miles from the nearest known populations.

Compared to other high-elevation sites in the southern Rocky Mountains and Colorado Plateau, the vegetative communities of the VCNP are quite diverse. In surveys conducted in 2001, the New Mexico Natural Heritage Program documented 60 distinct plant associations within the preserve. Of these, fully half were associations that had not been identified elsewhere, mostly grassland and wetland vegetation types. Particularly interesting and unique is an acidic, boggy, wet meadow (or fen) in Alamo Canyon with peat deposits more than 16 feet thick that contains a record of vegetation and fire activity dating over 9,000 years. In general, the preserve supports some of the largest tracts of old-growth conifer forest remaining in the Jemez Mountains, along with extensive montane grassland and wetland communities that are relatively rare in the southern Rocky Mountains.

WILDLIFE

Elk were extirpated from the Jemez Mountains by 1900, but today,

following transplants of 49 head in 1947 and an additional 58 in 1964, they are abundant and conspicuous, especially within the preserve. The New Mexico Department of Game and Fish (NMDGF) estimated in 2001 that more than 4,500 elk used the VCNP during the summer months and concluded that the preserve was the core breeding ground for elk in the Jemez Mountains. Although deep winter snows drive many elk to lower elevations on nearby lands, in dry winters large numbers remain on the preserve year-round.

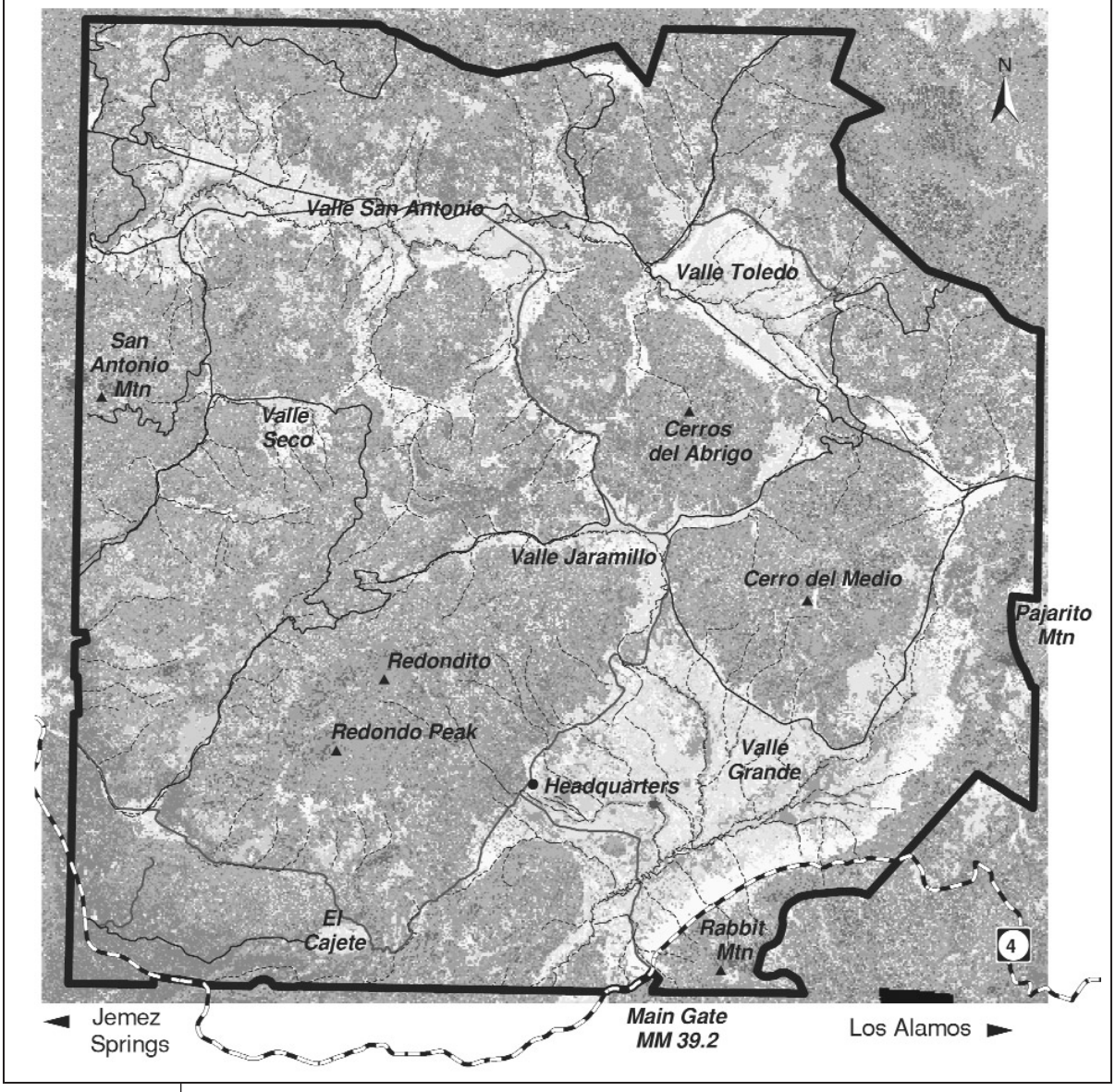
Elk hunting and elk viewing are among the greatest attractions of the VCNP, and management of elk populations within the preserve will unquestionably be one of the most complex challenges facing the Valles Caldera Trust, as well as the New Mexico Department of Game and Fish, which bears primary responsibility for managing game animals within the state. Because large numbers of elk migrate annually between the preserve and the rest of the Jemez Mountains, the VCT, the NMDGF, and other entities from throughout the region will need to cooperate closely to address elk management in a broad, ecosystem context.

Beyond elk, Valles Caldera wildlife was poorly documented until baseline studies began in 2001. The preserve is currently working with many partners to learn about the status and trend of local animal populations from birds to butterflies. For example, fieldwork on the preserve in 2001 and 2002 documented 63 species of butterflies, and the preserve appears to be the southernmost limit of the range for one of them.

Once considered plentiful in the Valles Caldera, mule deer are now scarce. The decline of mule deer is a region-wide phenomenon and, while not fully understood, is usually attributed to a combination of factors, including overhunting, territorial competition with elk, increased predation by coyotes, and a decrease in the early successional shrubby vegetation that is a mainstay of their diet. The last three of these factors may account for the low deer numbers within the caldera. It is unknown whether deer numbers are continuing to decline or have stabilized at low levels.

Other large mammals present within the preserve include coyotes, which are ubiquitous and plentiful, black bear, mountain lion, and bobcat. Although the latter three species are rarely observed, their populations are presumed to be viable and proportionate to available habitat, given the abundance of prey and the absence of recent hunting pressure.

Many other smaller mammals are also present, notably including the isolated Jemez Mountains population



Vegetation Map

Miles

0 5

Preserve Boundary
State Road 4
Plant Assemblages
Preserve Roads
Stream, Perennial
Stream, Intermittent

Vegetation map showing different plant assemblages on the Valles Caldera National Preserve. Shades of gray indicate different plant assemblages (grasslands, wetlands, ponderosa pine forests, mixed-conifer spruce-fir forests, and aspen stands).

This map is representative of the research, inventory, and monitoring projects under way on the preserve; other maps of preserve resources currently being developed include soils, geologic formations, forest biomass (fuel) inventories, and species distributions (plants and animals).

Elk are the most conspicuous wildlife of the VCNP.

of pikas. The preserve contains most of the habitat for this most southerly subspecies of pika. The preserve also supports substantial numbers of Gunnison's prairie dog, which is relatively common throughout the grasslands of the caldera. The population of this species appears to fluctuate widely, due possibly to localized outbreaks of sylvatic plague. Prairie dogs are an important prey species for a number of predators, including golden eagles.

Three important mammals are no longer present in the caldera. Grizzly bear and gray wolf were eliminated from the Jemez Mountains early in the last century, and the last beavers in the caldera were observed along Indian Creek in the 1990s. At 89,000 acres, the preserve is far too small to host the reintroduction of grizzly bears or wolves, but eventually, if woody vegetation can be restored to key riparian habitats and if substantial stands of aspen can be reestablished, the reintroduction of beaver may become practical.

Bird surveys in 2001 and 2002 found at least 107 species on the preserve, of which 92 species showed evidence of breeding locally. Uncommon species recorded so far include Wilson's snipe, Savannah sparrow, eastern meadowlark, and ruby-crowned and golden-crowned

kinglets. Sensitive raptor species found here include northern goshawk, golden and bald eagles, and peregrine falcons. The abundance of fish and the presence of elk carcasses attract significant numbers of bald eagles in the fall, which feed and roost on the preserve for weeks.

Four native fish species are known from the preserve, along with abundant non-native brown and rainbow trout that have apparently displaced the native Rio Grande cutthroat trout. The preserve will work with the New Mexico Department of Game and Fish and others to consider the potential for restoring native cutthroat trout to parts of one or more of the preserve's streams.

Amphibian surveys in 2002 found abundant chorus frogs and tiger salamanders. Northern leopard frogs, abundant as recently as the 1970s along Redondo Creek, appear to have been extirpated from the preserve, as is the case across much of the region, perhaps due to the spread of disease. A few endemic Jemez Mountains salamanders were found in 2002, but population trends for this rare creature are unknown, in part because the salamanders, which live mainly underground, are extremely hard to study. The preserve includes the heart of the small range of this unique salamander, which is listed as "threatened" by the state of New Mexico. In addition, two lizard and three snake species have thus far been found on the preserve.

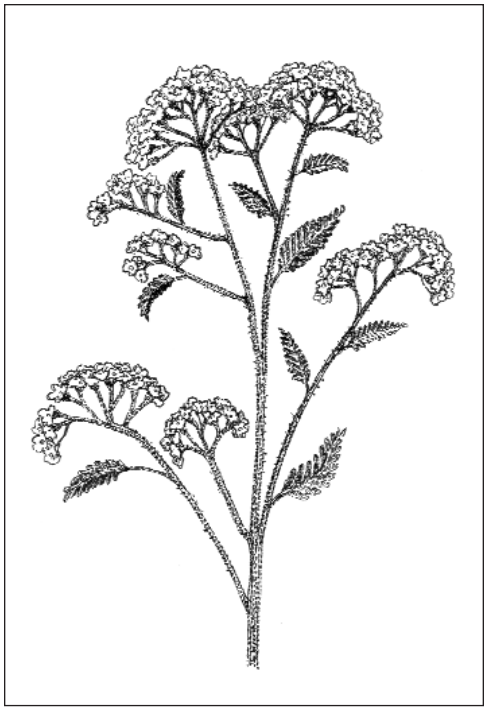
WEEDS AND PROBLEM SPECIES

In general, invasive or noxious weeds are not at present a major problem, although 20 species of state-listed "noxious weeds" have been identified within the preserve. The challenge will be to prevent significant problems as human activities increase and as people inadvertently transport the seeds of weed species into the preserve. The extensive network of old roads, arroyos, abandoned salt grounds, and other high-impact spots provide receiving areas for weeds to become established. Eleven discrete concentrations of Canada thistle, only one of which exceeds an acre in size, have been identified within the preserve. Treatment of these areas should begin in 2004. Many other potential problem species are unknown within the preserve but are present in surrounding areas, and so the trust will need to be vigilant in guarding against weed introductions and in detecting and responding to any introductions that occur. Similarly, vigilance will be required to prevent the introduction of such non-native pathogens as whirling disease, which devastates trout populations, and white pine blister rust, which could damage the

stately southwestern white pines found within the preserve.

SUMMARY

The valles and volcanic domes within the main caldera have been formed over the last 1.22 million years by a long series of volcanic eruptions. The caldera itself has changed considerably through time, with 10 major domes formed incrementally at approximately 100,000-year intervals. About 500,000 years ago, the caldera was a closed basin containing a large lake; the water from this lake eventually broke through the western wall of the caldera and, in a cataclysmic flood, formed the present-day Cañon de San Diego, through which the Jemez River currently flows. The present-day ecosystems of the caldera include grasslands, mixed-conifer forests, and a variety of aquatic habitats (including geothermal hot springs, cold-water springs, acid pools, bogs, and two major mountain stream watersheds). Over 550 species of plants, constituting nearly 60 vegetation associations, are supported across these ecosystems. The caldera also supports a rich community of mammals, birds, and invertebrates, along with smaller contingents of reptiles, amphibians, and fishes. Although a considerable part of the caldera is in relatively good condition, other sections exhibit signs of degradation, likely due to historic human land uses such as livestock grazing, forestry, and road development. Preliminary assessments indicate that these degraded areas are beginning to recover, and with continued careful stewardship, these habitats should continue their recovery in the future.



Yarrow is a common herb of the VCNP.