requirements for this species within these counties.

Section 404 of the Clean Water Act, administered by the U.S. Army Corps of Engineers (Corps), could provide for conservation or protection of Berberis nevinii populations along alluvial features. Alluvial scrub habitats, which historically supported Berberis nevinii, have been reduced in extent by 95 percent due to urban and agricultural development (CNDDB 1992, Rey-Vizgirdas 1994). These habitats must be considered under CEQA or NEPA and may be regulated, in part, by the permitting processes of the Corps under section 404 of the Clean Water Act. Under section 404 the Corps regulates, through a permitting program, the discharge of dredged or fill material into waters of the United States. Waters of the U.S. include lakes, rivers, streams and any wetlands adjacent to these features, as well as isolated wetland areas. However, upland (non-wetland) areas are not subject to regulation or protection under the Corps' regulatory program. Depending on the frequency and duration of inundation, soil characteristics and vegetative composition of *B. nevinii* habitat, potential habitat for the species may not be within the jurisdictional boundaries of section 404. As a result, any projects affecting such habitat likely would receive no environmental review. Federal candidate species receive no special consideration under section 404. In addition, emergency flood control measures may circumvent compliance with these statutes. For example, as part of emergency measures, vegetation stripping occurred in Riverside and San Bernardino counties throughout the potential range of B. nevinii after flooding subsided in the spring of 1993.

The Act may incidentally afford protection to the species under consideration in this proposal if they coexist with species already listed as threatened or endangered under the Act. The least Bell's vireo (Vireo bellii pusillus), coastal California gnatcatcher (Polioptila californica californica), southwestern willow flycatcher (Empidonax traillii extimus), arroyo toad (Bufo microscaphus californicus), slender-horned spineflower (Dodecahema leptoceras), and Santa Ana River woolly star (Eriastrum densiflorum ssp. sanctorum) are listed as endangered or threatened under the Act and occur within the same geographical area as the species proposed herein. However, these species are not found in the same habitat as three of the proposed plant taxa. Though Berberis nevinii is known to occur in alluvial fan scrub which is

also known to be occupied by *D. leptoceras*, and *E. densiflorum* ssp. *sanctorum*, these species are not known from any specific site where *B. nevinii* also occurs.

The Nature Conservancy has acquired lands on Sycuan Peak and McGinty Mountain in San Diego County, which protect part of the population of Nolina interrata (CDFG 1992), however the amount of habitat acquired is not adequate to ensure protection of the species. Acquisition of lands to protect Berberis nevinii and Fremontodendron *mexicanum* has been proposed by the Bureau of Land Management (1992), but the action has not yet been implemented. These actions would increase protection for a small segment of the *B. nevinii* population, and all of the known populations of F. mexicanum in the United States.

The proposed land acquisitions and management practices discussed above would protect significant portions of the populations of the plant species considered herein, and the Service supports their implementation. However, these actions are only proposed and the likelihood of their implementation is uncertain. Even if implemented, they would not eliminate threats due to an alteration of the natural fire periodicity, habitat fragmentation, and randomly occurring natural events (discussed below). Significant portions of these plant populations would still not have appropriate management or would be outside the proposed areas of acquisition (with the exception of F. mexicanum).

E. Other natural or manmade factors affecting their continued existence. Fire management practices are adversely affecting Ceanothus ophiochilus, Berberis nevinii, Nolina interrata, and Fremontodendron mexicanum because the habitat requirements for these species depend upon natural fire patterns. Alteration of natural fire periodicity can have various adverse effects on plants that evolved to survive in an ecosystem that included natural fires. Human population increases are generally accompanied by increased incidence of local accidental fires. As regional population density continues to increase, fire suppression measures are intensified in surrounding undeveloped areas. The natural period between fires in these areas then may be lengthened. Also, during fire events, bulldozers are used to scrape fire breaks through vegetation to stop the advance of a fire. Fire breaks may increase erosion on slopes which may slow chaparral (and species) recovery.

Although *Ceanothus ophiochilus* is dependent on occasional fires for seed germination, it does not reproduce vegetatively after a fire. Very high fire frequencies prevent newly germinated plants from reaching reproductive maturity and will result in population declines or extirpation once the underground seed bank has been depleted.

In other cases, the reduced frequency of fire due to fire suppression programs can adversely affect the viability of plant populations by reducing genetic diversity. While frequent fires are a threat to the survival of *Ceanothus ophiochilus*, fire suppression would also represent a threat to this species because it would inhibit seed germination. Therefore, controlled burns may be necessary, in some cases, to maintain population vigor and rejuvenation (Boyd 1991).

Likewise, flowering of *Nolina interrata* is stimulated by fire. In the absence of fire, it reproduces primarily by cloning a new plant from its underground caudex. Genetic diversity for *N. interrata* can only be maintained if the plant flowers and reproduces sexually. One population is cloned from a single female plant. If populations are entirely female, pollen from disjunct populations would be required for flower fertilization. However, flowers in disjunct populations may not bloom simultaneously since flowering is, in part, dependent upon fire (Dice 1989).

The effects of altered fire frequencies on *Berberis nevinii* are not known. Basal burls indicate that *B. nevinii* is able to stump sprout; however, vegetative propagation has been unsuccessful in cultivation. This species propagates in the wild by seed, but seed production and fertility are sporadic.

Hybridization threatens Ceanothus ophiochilus throughout its populations. Potential hybrids have been observed at the edge of the Vail Lake population, near the contact zone with adjacent metasedimentary substrates. The other three populations, located nearby in the Agua Tibia Wilderness Area, have been significantly affected by hybridization with C. crassifolius. At least 10 to 15 percent of two of the Agua Tibia populations represent pure hybrid individuals and it is likely that a large portion, or possibly all of the individuals in these populations are introgressed to some degree (Shaffer 1993). The hybridization is likely the result of disturbance by fire and fire management practices such as bulldozed firebreaks (Chris Frazier, San Diego State University, in litt. 1993).

Risk of extinction from naturally occurring events threatens all of the