Threats						
Species	Trampling	Exotic plants	ORV activity	Develop- ment activity	Grazing	Limited numbers
Arabis johnstonii Arenaria ursina Castilleja cinerea Eriogonum kennedyi var. austromontanum Poa atropurpurea Taraxacum californicum Trichostema austromontanum ssp. compactum	****	× × × × ×	× × × × × × × × ×	× × × × ×	× × × ×	x x x

## TABLE 1.—SUMMARY OF THREATS

A. The present or threatened destruction, modification, or curtailment of their habitat or range. The seven taxa considered herein currently are threatened by a variety of activities that result in habitat modification, destruction, degradation, and fragmentation. These activities include urbanization, vehicular activity, hydrologic alterations, and habitat degradation by livestock.

Five of the seven taxa proposed in this rule (*Poa atropurpurea, Taraxacum californicum, Arenaria ursina, Castilleja cinerea,* and *Eriogonum kennedyi* var. *austromontanum*) are predominantly found in pebble plains or meadow habitats in the vicinity of Big Bear Lake in the eastern San Bernardino Mountains. Pebble plains soils contain significant amounts of clay, and are subject to extreme diurnal and seasonal variation in soil temperature and moisture conditions. These soils have an extremely slow infiltration rate and, thus, have a high runoff potential.

Prior to European settlement, pebble plain and meadow habitats were much more abundant in the Big Bear Valley. Krantz (1987) estimated that over 1,000 ha (2,500 ac) of pebble plains and natural meadowlands were lost due to the construction of a dam and the resultant creation of Big Bear Lake in 1883. Subsequent urbanization of the valley, land disturbance from livestock, and off-road vehicle use, destroyed or damaged much of the remaining pebble plain and meadow habitat (Krantz 1987, Neel and Barrows 1990). These factors contributed to the decline of two meadow endemic species found only in the Big Bear Valley area, Sidalcea pedata (pedate checker-mallow) and Thelypodium stenopetalum (slenderpetaled mustard), which were federally listed as endangered in 1984 (49 FR 34497). Nine existing pebble plain complexes have been identified (Neel and Barrows 1990). Less than 220 ha (550 ac) of this highly restricted community remain; about 208 ha (514 ac) is administered by the Forest Service and approximately 12 ha (32 ac) occurs on private land (Neel and Barrows 1990).

Recreational activities have affected and continue to affect the habitat of Arabis johnstonii, Arenaria ursina, Castilleja cinerea, Eriogonum kennedyi var. austromontanum, Trichostema austromontanum ssp. compactum, Poa atropurpurea, and Taraxacum californicum. These activities include heavy, widespread hiking; off-road vehicle use; and development of campgrounds, trails, and ski areas. The San Bernardino National Forest (SBNF) has the highest recreational use of any national forest (SBNF Draft Wildlife, Fisheries, Botany, and Threatened and Endangered Species Program 5-year plan, 1992). The Forest Service has implemented a number of measures (including fencing and signing) to protect pebble plains from illegal offroad vehicle activity. Despite this action, over 40 percent of the pebble plains habitat within Forest Service jurisdiction remains unprotected (Neel and Barrows 1990). Because of the heavy recreational pressures on the SBNF, unauthorized off-road vehicle use remains a threat to these species. The Forest Service has limited resources available for preventing recreational impacts to these habitats. Most of the privately owned pebble plains habitat receive no formal protection. A few, however, have voluntary non-binding landowner agreements to protect this habitat. See Factor D for additional information.

Vehicles cause considerable damage to pebble plains habitat, and all pebble plains habitat have some road development. The pebble plains are extremely susceptible to damage during spring thaw (Krantz 1981a). During the wet season, vehicles both directly destroy plants and create deep ruts that change the water flow patterns over the pebble plains, potentially indirectly affecting greater numbers of plants (Neel and Barrows 1990). All known Arenaria ursina and Eriogonum kennedyi var. *austromontanum* populations have been affected by vehicle use to some extent (Krantz 1981a). Vehicular activity directly impacts plants by crushing the plants and compacting and eroding the soil. Although the erosion potential of the soil is not considered high, due to the moderate slopes and rainfall, vehicle use can lead to a breakdown in soil structure (Neel and Barrows 1990). Vehicular activity also favors the establishment of species more tolerant of such disturbance, thereby altering the composition of the plant community over time.

Extensive damage to the pebble plains near North Baldwin Lake occurred in March 1992. A construction vehicle (front-end loader) from the adjacent San Bernardino County landfill was driven over this plant site while the soils were saturated and highly vulnerable to disturbance (Neel and Chaney 1992). Although the site was completely fenced and posted as a rare plant site, the driver trespassed onto the site, drove over the identifying signs and fences, and caused extensive damage to the habitat in an apparently intentional act of vandalism (Tim Krantz, consultant, in *litt.* 1993). Over 1,200 sq m (13,000 sq ft) of pebble plain habitat was moderately to severely damaged from this event. Although restoration was required by the Forest Service, it was not entirely successful since the indirect effects, including alteration of surface hydrology and the subsequent invasion of exotic species, can have significant, long-term effects on this delicate ecosystem (Neel and Chaney 1992, Krantz, in litt. 1993). These impacts are not easily reversed because soil compaction could impede germination and the exotic species could compete for nutrients for extensive periods of time.

Incidents involving destruction or degradation of pebble plains habitat by off-road vehicles and vehicular trespass have occurred in the past, and continue to present a significant threat to all pebble plain sites (Maile Neel, SBNF,