

Historically, the habitat of each of the two remaining populations of *Poa napensis* has been reduced by the development of health spas and resorts in the city of Calistoga and other construction activities at the Calistoga Airport (CNPS 1987). The remnant population of *P. napensis* at the Calistoga Airport was thought to be extirpated as a result of construction activities in 1981, because no plants were found that year. By 1987, however, 500 plants were counted at the airport location (CDFG 1979; J. Ruygt, *in litt.* 1993). Because *Poa napensis* and *Plagiobothrys strictus* co-occur at the Calistoga Airport and another site in the city of Calistoga, the threats from urbanization, including construction of a hospital, are similar for both species at these sites (CNPS 1987, 1990; J. Ruygt, *in litt.* 1993).

Coastal Species

The single known population of *Carex albida* is located approximately 46 m (150 ft) from State Highway 116, which is a potential source of disturbance. Any change in hydrology of the area resulting from highway construction or maintenance or change in land use would adversely affect the population. Draining the wetland would not only directly impact the species, but would encourage the spread of blackberry (*Rubus* spp.). Invading blackberry vines have become dominant in other parts of Pitkin Marsh that have been drained (CNDDDB 1993; B. Guggolz, *in litt.* 1993).

A wastewater treatment project for the cities of Forestville and Graton, Sonoma County, is proposed to be built 0.3 km (0.2 mi) from the single extant population of *Carex albida*. Potential impacts from this project include application of recycled wastewater and temporary or permanent removal of wetlands, riparian vegetation, and special status plants and their habitats (Environmental Science Associates (ESA) 1993). From 1,200 to 4,900 cubic m (1 to 4 ac-ft) of wastewater per year would be applied on approximately 14 to 27 ha (35 to 60 ac) of land. Although the population of *C. albida* would not be directly impacted, the application of this volume of wastewater could result in the alteration of the remaining habitat within the historical range of *C. albida* through modification of surface drainage patterns (ESA 1993). The historical ranges of *Lilium pardalinum* ssp. *pitkinense* and *Alopecurus aequalis* var. *sonomensis* also occur within the project boundaries.

The type locality of *Clarkia imbricata* along the roadside at Pitkin Ranch was extirpated prior to 1974, as a probable result of changes in land use or roadside

maintenance (B. Guggolz, *in litt.* 1993). Another population of *C. imbricata* in Sonoma County has been extirpated as a result of Christmas tree farming and weed control activities (B. Guggolz, *in litt.* 1993). The larger of the two extant populations of *C. imbricata* is threatened by changing land use such as agricultural land conversion (B. Guggolz, *in litt.* 1993).

One population of *Lilium pardalinum* ssp. *pitkinense* was largely destroyed by urbanization in 1961; however, approximately 200 plants remain (CDFG 1993b; B. Guggolz, pers. comm. 1993). Although a subdivision is currently planned for the area surrounding a portion of this population, the landowner has agreed to place the *L. pardalinum* ssp. *pitkinense* habitat area in a conservation easement. The agreement between CDFG and the landowner places all sensitive natural resource areas in a conservation easement for long-term management, with CDFG as easement holder (A. Buckmann, CDFG, *in litt.* 1993). Wetland fills at Pitkin Marsh have lowered the water table and resulted in drier soil conditions, which has negatively affected *L. pardalinum* ssp. *pitkinense*. This change in habitat quality is considered an ongoing threat to the population at Pitkin Marsh, since there are only two plants remaining (CDFG 1993b).

The two populations of *Sidalcea oregana* ssp. *valida* are threatened by permitted and apparently unauthorized water diversions from the unnamed stream that feeds Kenwood Marsh. In the past, unauthorized diversions have removed all water from the stream channel, eliminating one source of surface water to the marsh (A. Howald, pers. comm. 1993). Plant census data from 1991 indicate that the eastern subpopulation in Kenwood Marsh declined by approximately 40 percent and the western subpopulation declined by approximately 30 percent compared to 1989 and 1990 data. These figures suggest that the Kenwood Marsh population may be experiencing a delayed response to a drought. The effects of the drought may be exacerbated by effects of increased surface water diversion and result in a further decline in the population (John Turner, CDFG, *in litt.* 1993).

Trifolium amoenum has been extirpated from all of its 24 historical occurrences in 7 counties. Loss of this habitat resulted primarily from urbanization and land conversion to agriculture (Zoe Chandik, CNPS, *in litt.* 1993). The most recently discovered occurrence, found in 1993 in Sonoma County, consisted of one plant located

on privately owned property that is currently for sale (CNDDDB 1994). If this property is developed or altered, it may no longer contain suitable habitat for *T. amoenum*. In addition, the human population of Sonoma County is expected to grow by 21.4 percent by the year 2000 (California Department of Finance 1992), and any remaining *T. amoenum* habitat may be converted to urban use.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

One of the two populations of *Lilium pardalinum* ssp. *pitkinense* has been nearly extirpated by uncontrolled collection of plants, seeds, and bulbs for horticultural use. This species was abundant historically at the Pitkin Marsh site, but the removal of plants and bulbs for horticultural use has reduced this population to two plants (CDFG 1993b). Similar activities at the remaining site, containing only 200 plants, would result in the extinction of the species (B. Guggolz, pers. comm. 1993). Of the two remaining populations of *Clarkia imbricata*, one population is found in a preserve owned by the California Native Plant Society (CNPS). Although CNPS has attempted to discourage unauthorized collection by fencing the preserve and by not publicizing the exact location of the site, trespassers have damaged the fence, trampled the vegetation, and collected seed of *C. imbricata* on several occasions (B. Guggolz, *in litt.* 1993). Any occurrences of *Trifolium amoenum* that may be discovered in the future also may attract collectors of plants or seed because the species was previously considered to be extinct. Overutilization is currently not known to be a factor for the remaining six species, but unrestricted collecting for scientific or horticultural purposes or excessive visits by individuals interested in seeing rare plants could result from increased publicity as a result of this proposal.

C. Disease or Predation

All five populations of *Alopecurus aequalis* var. *sonomensis* are grazed by cattle (CNDDDB 1993), but only two populations in Sonoma County, containing a total of 50 plants, are currently threatened by cattle grazing (CNDDDB 1993). One population on the Point Reyes National Seashore was fenced in 1987 to stop cattle from overgrazing (V. Norris, *in litt.* 1993). The species presently consists of only 200 known plants.

Carex albida is currently not grazed, although cattle graze other portions of the parcel on which the species is