''Brandegee says of *B. pinnata*, that it is 'common' on S.C.'' (S. Junak, in litt. 1994); *Berberis pinnata* ssp. *insularis* is currently known from three small populations. In 1890, Brandegee wrote that *Heuchera maxima* was ''not uncommon throughout Santa Cruz Island'' (Hochberg *et al.* 1980a); it is currently reduced to 12 populations on that island, and 11 populations on West Anacapa Island. Apparently, *Malacothamnus fasciculatus* var. *nesioticus* was already rare by the turn of the century; Greene wrote that the plant was ''rare; only two bushes seen, and these under the protection of large opuntias; perhaps thus kept from the sheep'' (Hochberg *et al.* 1980a).

Seabirds have altered historic habitat for *Malacothrix indecora* on San Miguel Island and Prince Island, and known sites for *Malacothrix squalida* on Anacapa Island. CINP has been monitoring certain seabirds, including the double-crested cormorant (*Phalacrocorax auritus*), the pelagic cormorant (*Phalacrocorax pelagicus*), the federally endangered brown pelican (*Pelecanus occidentalis*), the western gull (*Larus occidentalis*), and Cassin's auklet (*Ptychoramphus aleuticus*), on islands within CINP since 1985. Many of these bird species experienced severe population declines in the late 1960's and early 1970's as a result of DDT-related reproductive failures (Ingram 1994). However, monitoring results indicate that populations of most of these birds have increased over the past decade. Seabirds use local vegetation to construct nests on cliff and blufftop sites, create localized soil disturbances that facilitate establishment of alien plant species, and promote erosion of coastal bluffs. Seabird activity has been noted on Middle Anacapa Island within habitat for *Malacothrix squalida* (S. Junak, pers. comm. 1994).

In 1990, seabirds on Prince Island included 10,000 Cassin's auklets and 240 double-crested cormorants (Ingram 1994); other seabirds that nest on the island but were not monitored include the ashy storm-petrel (*Oceanodroma homochroa*), Leach's storm-petrel (*Oceanodroma lencorhoa*), Brandt's cormorant (*Phalacrocorax penicillatus*), pelagic cormorant, brown pelican, western gull, pigeon guillemot (*Cepphus columba*), and Xantus' murrelet (*Synthliboramphus hypoleuca*). Due to the degree of protection afforded this nesting activity by CINP, surveys for *Malacothrix indecora* within historic habitat have not been done since the taxon was last seen there in 1978. Given the size of the island (24 hectares (60 acres)) and the number of nesting birds, habitat for *Malacothrix indecora* has likely been affected.

Compaction of soils and crushing of plants resulting from vehicle traffic is a potential threat to three of the proposed taxa on Santa Rosa Island: *Dudleya blochmaniae* ssp. *insularis*, *Dudleya* sp. nov. ''East Point,'' and *Gilia tenuiflora* ssp. *hoffmannii*. Populations of all three taxa occur at sites where vehicles were historically or are currently used. The only known population of *Gilia tenuiflora* ssp. *hoffmannii* is bisected by a road.

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

Unrestricted collecting for scientific or horticultural purposes and excessive visits by individuals interested in seeing rare plants constitutes a potential threat to certain of the taxa in this proposal. In particular, the collection of whole plants or reproductive parts of those annual or herbaceous perennial taxa with fewer than 100 individuals, including *Arabis hoffmannii*, *Berberis pinnata* ssp. *insularis*, *Malacothamnus fasciculatus* var. *nesioticus*, *Malacothrix indecora*, *Malacothrix squalida*, and *Thysanocarpus conchuliferus*, could adversely affect the genetic viability and survival of those taxa. In the horticultural trade, *Dudleya* species have, in particular, been favorite collection items. *Dudleya* sp. nov. ''East Point'' was collected and introduced into the horticultural trade long ago as ''white sprite.'' *Dudleya blochmaniae* ssp. *insularis* and *Dudleya nesiotica*, though not in the trade, have been cultivated by Dudleya enthusiasts. The limited distribution of these three taxa makes them vulnerable to such enthusiasts. *Heuchera maxima* is also found in cultivation; the threat of collection for this taxon is unknown.

C. Disease or Predation

In 1875, when sheep stocking on Santa Cruz Island was around 50,000 head, botanist J.T. Rothrock reported that the island was so overgrazed that ''it was with difficulty that I could get even a decent botanical specimen'' (Hobbs 1983). Although sheep grazing has been removed as a current threat, the decades of overgrazing by sheep have had long-term effects in reducing the reproductive capabilities and distribution of many of the taxa included in this proposal. A review of literature pertinent to effects of sheep on island vegetation is included in Hochberg *et al.* (1980a). Feral pigs, feral goats, sheep, deer, elk, horses, and bison currently occur in habitats that support populations of most of the taxa included in this proposal. In addition to modifying habitat through altering the structure and composition of plant communities, altering hydrologic and soil characteristics, and increasing the potential for erosion as discussed under Factor A, non-native mammals also affect the proposed plant taxa through direct herbivory. The effects of defoliation on plants include decreased aboveground biomass, fewer stems, less seed, reduced height of leaves and stems, decreased root biomass, reduced root length, decreased carbohydrate reserves, and reduced vigor (Heady in Willoughby 1986).

The effects of grazing animals on plants can be demonstrated by studies on oaks and pines on the Channel Islands. On Santa Cruz Island, oak groves are more numerous and in better condition than those on Santa Rosa Island, but still show no signs of recruitment due to pig rooting. A recent comparison of fenced and unfenced sites under live oak (*Quercus agrifolia*) tree canopies showed a significant number of oak seedlings within the fenced sites (Peart *et al.* 1994). On Santa Cruz Island, the removal of feral sheep has been credited with allowing the reestablishment of native woody perennials including the Bishop pine (*Pinus muricata*) (Wehtje 1994). On Santa Rosa Island, the Bishop pine continues to display low recruitment and high older-tree mortality caused by deer browsing, placing the population ''at risk'' (of extirpation) under present conditions (Viers and Halvorson 1994). The Santa Cruz Island ironwood (*Lyonothamnus floribundus* ssp. *asplenifolius*), a Category 2 candidate for Federal listing, is similarly lacking in recruitment on Santa Rosa Island.

Clark *et al.* (1990) noted that most individuals of Santa Rosa Island manzanita suffer from severe browsing by elk and deer. The shape of individual shrubs has been modified as a result of browsing. Short-statured shrubs have been hedged to the point that they do not grow above a certain height; in shrubs that attained a taller stature before browsing pressure became severe, all lower limbs and leaves have been stripped, resulting in a ''lollipop'' or tree-shaped shrub. Apparently, the browsing pressure on Santa Rosa Island manzanita has affected its ability to reproduce; Clark reported not seeing a single seedling during a survey in 1988 (Ronilee Clark, ecologist, California Park Service, pers. comm. 1994).

The widespread effects of grazing on island vegetation have been illustrated through the above examples; similar effects on the proposed taxa are inferred. However, specific examples of