

### C. Primary Constituent Elements

In accordance with section 3(5)(A)(i) of the Act and regulations at 50 CFR 424.12, in determining which areas to propose as critical habitat, we are required to base critical habitat determinations on the best scientific and commercial data available and to consider those physical and biological features (primary constituent elements) that are essential to the conservation of the species and that may require special management considerations or protection. These features include, but are not limited to: Space for individual and population growth, and for normal behavior; food, water, air, light, minerals, or other nutritional or physiological requirements; cover or shelter; sites for breeding, reproduction, or rearing of offspring, germination, or seed dispersal; and habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

Much of what is known about the specific physical and biological requirements of *Abutilon eremitopetalum*, *Adenophorus perians*, *Bidens micrantha* ssp. *kalealaha*, *Bonamia menziesii*, *Brighamia rockii*, *Cenchrus agrimonoides*, *Centaurium sebaeoides*, *Clermontia oblongifolia* ssp. *mauiensis*, *Ctenitis squamigera*, *Cyanea grimesiana* ssp. *grimesiana*, *Cyanea lobata*, *Cyanea macrostegia* ssp. *gibsonii*, *Cyperus trachysanthos*, *Cyrtandra munroi*, *Diellia erecta*, *Diplazium molokaiense*, *Gahnia lanaiensis*, *Hedyotis mannii*, *Hedyotis schlechtendahlana* var. *remyi*, *Hesperomannia arborescens*, *Hibiscus brackenridgei*, *Isodendron pyrifolium*, *Labordia tinifolia* var. *lanaiensis*, *Melicope munroi*, *Neraudia sericea*, *Portulaca sclerocarpa*, *Sesbania tomentosa*, *Solanum incompletum*, *Spermolepis hawaiiensis*, *Tetramolopium remyi*, *Vigna o-wahuensis*, and *Viola lanaiensis* is described above in the "Background" section of this final rule. We are unable to identify these features for *Mariscus fauriei*, *Silene lanceolata*, *Tetramolopium lepidotum* ssp. *lepidotum* and *Zanthoxylum hawaiiense*, which no longer occur on the island of Lanai, because information on the physical and biological features (i.e., the primary constituent elements) that are considered essential to the conservation of these four species on Lanai is not known (see 67 FR 9806).

All areas designated as critical habitat are within the historical range of the three species at issue and contain one or more of the physical or biological

features (primary constituent elements) essential to the conservation of the species.

As described in the discussions for each of the three species for which we are designating critical habitat, we are defining the primary constituent elements on the basis of the habitat features of the areas from which the plant species are reported, as described by the type of plant community (e.g., mesic *Metrosideros polymorpha* forest), associated native plant species, locale information (e.g., steep rocky cliffs, talus slopes, gulches, streambanks), and elevation. The habitat features provide the ecological components required by the plant. The type of plant community and associated native plant species indicate specific microclimate (localized climatic) conditions, retention and availability of water in the soil, soil microorganism community, and nutrient cycling and availability. The locale indicates information on soil type, elevation, rainfall regime, and temperature. Elevation indicates information on daily and seasonal temperature and sun intensity. Therefore, the descriptions of the physical elements of the locations of each of these species, including habitat type, plant communities associated with the species, location, and elevation, as described in the **SUPPLEMENTARY INFORMATION: Discussion of the Plant Taxa** section above, constitute the primary constituent elements for these species on the island of Lanai.

### D. Criteria Used To Identify Critical Habitat

The lack of detailed scientific data on the life history of these plant species makes it impossible for us to develop a robust quantitative model (e.g., population viability analysis (National Research Council 1995)) to identify the optimal number, size, and location of critical habitat units to achieve recovery (Beissinger and Westphal 1998; Burgman *et al.* 2001; Ginzburg *et al.* 1990; Karieva and Wennergren 1995; Menges 1990; Murphy *et al.* 1990; Taylor 1995). At this time, and consistent with the listing of these species and their recovery plans, the best available information leads us to conclude that the current size and distribution of the extant populations are not sufficient to expect a reasonable probability of long-term survival and recovery of these plant species. Therefore, we used available information, including expert scientific opinion, to identify potentially suitable habitat within the known historic range of each species.

We considered several factors in the selection and proposal of specific boundaries for critical habitat for these three species. For each of these species, the overall recovery strategy outlined in the approved recovery plans includes: (1) Stabilization of existing wild populations, (2) protection and management of habitat, (3) enhancement of existing small populations and reestablishment of new populations within historic range, and (4) research on species biology and ecology (Service 1995, 1996a, 1997). Thus, the long-term recovery of these species is dependent upon the protection of existing population sites and potentially suitable unoccupied habitat within their historic range.

The overall recovery goal stated in the recovery plans for each of these species includes the establishment of 8 to 10 populations with a minimum of 100 mature, reproducing individuals per population for long-lived perennials; 300 mature, reproducing individuals per population for short-lived perennials; and 500 mature, reproducing individuals per population for annuals. There are some specific exceptions to this general recovery goal of 8 to 10 populations for species that are believed to be very narrowly distributed on a single island, but that does not apply to the three species. To be considered recovered, the populations of a multi-island species should be distributed among the islands of its known historic range (Service 1995, 1996a, 1997). A population, for the purposes of this discussion and as defined in the recovery plans for these species, is a unit in which the individuals could be regularly cross-pollinated and influenced by the same small-scale events (such as landslides), and which contains a minimum of 100, 300, or 500 mature, reproducing individuals, depending on whether the species is a long-lived perennial, short-lived perennial, or annual.

By adopting the specific recovery objectives enumerated above, the adverse effects of genetic inbreeding and random environmental events and catastrophes, such as landslides, hurricanes or tsunamis, that could destroy a large percentage of a species at any one time, may be reduced (Menges 1990; Podolsky 2001). These recovery objectives were initially developed by the HPPRCC and are found in all of the recovery plans for these species. While they are expected to be further refined as more information on the population biology of each species becomes available, the justification for these objectives is found in the current conservation biology