species have become pests (Smith 1985, Wagner et al. 1990). Naturalized, introduced species degrade the Hawaiian landscape and compete with native plants for space, light, water, and nutrients (Cuddihy and Stone 1990). Some of these species were brought to Hawaii by various groups of people, including the Polynesian immigrants, for food or cultural reasons. Plantation owners, alarmed at the reduction of water resources for their crops caused by the destruction of native forest cover by grazing feral animals, supported the introduction of alien tree species for reforestation. Ranchers intentionally introduced pasture grasses and other species for agriculture and, sometimes inadvertently, introduced weed seeds as well. Other plants were brought to Hawaii for their potential horticultural value (Cuddihy and Stone 1990, Scott et al. 1986, Wenkam 1969).

*Rubus rosifolius* (thimbleberry), native to Asia, is naturalized in disturbed mesic to wet forest on all of the main Hawaiian Islands (Wagner *et al.* 1990). This shrub threatens the only known population of *Cyanea dunbarii* (L. Mehrhoff, *in litt.* 1994).

Kalanchoe pinnata (air plant) is an herb that occurs on all the main islands except Niihau and Kahoolawe, especially in dry to mesic areas (Wagner *et al.* 1990). Air plant is a threat to the only known population of *Cyanea dunbarii* (L. Mehrhoff, *in litt.* 1994).

*Ricinus communis* (castor bean) became naturalized in Hawaii prior to 1819. Castor bean is found on all the main islands of Hawaii in low elevation, dry, disturbed habitats (Wagner *et al.* 1990). Castor bean is a threat to both populations of *Schiedea sarmentosa* (HPCC 1991b, 1992).

Two species of *Hedychium* (ginger) were introduced to Hawaii in the late 1800's, probably by Chinese immigrants. Both species escaped from cultivation and are found in lowland wet and mesic forests on most of the main Hawaiian islands. These large, vigorous herbs mainly reproduce vegetatively, forming very dense stands that exclude all other growth (Cuddihy and Stone 1990, Wagner *et al.* 1990). *Hedychium* threatens the only known population of *Cyanea dunbarii* (L. Mehrhoff, *in litt.* 1994).

*Commelina diffusa* (honohono) is an annual herb native to the Old World tropics. It has become widely naturalized and is found in disturbed mesic and wet forests and other disturbed sites on all of the main Hawaiian islands except Niihau and Kahoolawe (Wagner *et al.* 1990). This species is a threat to the only known population of *Cyanea dunbarii* (L. Mehrhoff, *in litt*. 1994).

Several hundred species of grasses have been introduced to the Hawaiian Islands, many for animal forage. Of the approximately 100 grass species that have become naturalized, one species threatens both populations of Schiedea sarmentosa. Melinis minutiflora (molasses grass), a perennial grass first brought to Hawaii for cattle fodder and then planted for erosion control, is now naturalized in dry to mesic disturbed areas on most of the main Hawaiian Islands. The mats it forms smother other plants, essentially preventing seedling growth and native plant reproduction. As a fuel for fire, molasses grass intensifies its heat and carries fire into areas with woody plants. It is able to spread prolifically after a fire and effectively compete with fewer fireadapted native plant species, creating a dense stand of alien grass where forests once stood. Molasses grass is becoming a major problem in dry sites along the many leeward ridges of East Molokai (Bottenfield 1958, Cuddihy and Stone 1990, O'Connor 1990, Smith 1985).

Fire is a major threat to native plant species in dry to mesic habitats, especially on the leeward slopes of Molokai, where the largest population of Schiedea sarmentosa is located (J. Lau, in litt. 1994). The presence of molasses grass greatly enhances the potential and destructiveness of fires. For example, in 1988, a human-caused fire consumed roughly 38 sq km (15 sq mi) of shrubland and forest from the southern coastline of East Molokai to the southwest corner of Kamakou Preserve, about 3.5 mi (5.5 km) inland (E. Misaki, pers. comm. 1991). Molasses grass was the main carrier of that fire (E. Misaki, pers. comm. 1991).

Erosion, landslides, and rock slides due to natural weathering result in the death of individual plants as well as habitat destruction. This especially affects the continued existence of species or populations with limited numbers and/or narrow ranges, including all three proposed species. This process is often exacerbated by human disturbance and land use practices (see Factor A).

The small numbers of populations and individuals of most of these species increase the potential for extinction from naturally occurring events. The limited gene pool may depress reproductive vigor, or a single humancaused or natural environmental disturbance could destroy a significant percentage of the individuals or the only known extant population. Two of the proposed species, *Cyanea dunbarii* and *Lysimachia maxima*, are known from only a single population. *Schiedea sarmentosa* is known from only two populations. *Cyanea dunbarii* is known from fewer than 20 individuals and *Lysimachia maxima* is known from fewer than 50 individuals.

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by these species in determining to propose this rule. Based on this evaluation, the preferred action is to list Cyanea dunbarii, Lysimachia maxima, and Schiedea sarmentosa as endangered. All 3 species either number fewer than 50 individuals in 1 population or are known from only 2 populations. The three species are threatened by one or more of the following-competition from alien plants; potential habitat degradation and/or predation by feral pigs, feral goats, rats, and deer; fire; substrate loss; potential human impacts; and lack of legal protection or difficulty in enforcing laws that are already in effect. Small population size and limited distribution make these species particularly vulnerable to extinction and/or reduced reproductive vigor from naturally occurring events. Because these three species are in danger of extinction throughout all or a significant portion of their ranges, they meet the definition of endangered as defined in the Act.

Critical habitat is not being proposed for the three species included in this rule, for reasons discussed in the "Critical Habitat" section of this proposal.

## Critical Habitat

Critical habitat is defined in section 3 of the Act as: (i) the specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection and; (ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such ares are essential for the conservation of the species. "Conservation" means the use of all methods and procedures needed to bring the species to the point at which listing under the Act is no longer necessary.

Section 4(a)(3) of the Act, as amended, and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, the Secretary designate critical habitat at the same time the species is listed. The Service finds that