TARIF 1	.—SUMMARY O	F THREATS-	-Continued
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Species	Alien mammals		Alien	Sub- strate	Fire	Human	Incosts	Limited	
Species	Goats	Pigs	Rats	plants	loss	File	impacts	Insects	Nos.*
Myrsine juddii Phyllostegia hirsuta Phyllostegia kaalaensis Pritchardia kaalae Schiedea kealiae Trematolobelia singularis Viola oahuensis		X X X X X	X P	X X X X X	X	P P P P	P P		X1.3 X1 X1 X1 X1 X1

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X=İmmediate and significant threat.

P=Potential threat.

*=No more than 100 individuals and/or no more than 5 populations.

1=No more than 5 populations.

2=No more than 10 individuals.

3=No more than 100 individuals.

The factors and their application to Chamaesyce herbstii W.L. Wagner ('akoko), Chamaesyce rockii (C. Forbes) Croizat & Degener ('akoko), Cyanea acuminata (Gaud.) Hillebr. (haha), Cyanea humboldtiana (Gaud.) Lammers, Givnish & Sytsma (haha), Cyanea koolauensis Lammers, Givnish & Sytsma (haha), Cyanea longiflora (Wawra) Lammers, Givnish & Sytsma (haha), Cyanea st.-johnii (Hosaka) Lammers, Givnish & Sytsma (haha), Cyrtandra dentata St. John & Storey (ha'iwale), Cyrtandra subumbellata (Hillebr.) St. John & Storey (ha'iwale), Cyrtandra viridiflora St. John & Storey (ha'iwale), Delissea subcordata Gaud. ('oha), Eragrostis fosbergii Whitney (No common name (NCN)), Gardenia mannii St. John & Kuykendall (nanu), Labordia cyrtandrae (Baill.) St. John (kamakahala), Lepidium arbuscula Hillebr. ('anaunau), Lobelia gaudichaudii ssp. koolauensis (Hosaka & Fosb.) Lammers (NCN), Lobelia monostachya (Rock) Lammers (NCN), Melicope saint-johnii (E. Hume) T. Hartley & B. Stone (alani), Myrsine juddii Hosaka (kolea), Phyllostegia hirsuta Benth. (NCN), Phyllostegia kaalaensis St. John (NCN), Pritchardia kaalae Rock (loulu), Schiedea kealiae Caum & Hosaka (NCN), Trematolobelia singularis St. John (NCN), and Viola oahuensis C. Forbes (NCN) are as follows:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Native vegetation on Oahu has undergone extreme alteration because of past and present land management practices including ranching, deliberate alien animal and plant introductions, agricultural development, military use, and recreational use (Cuddihy and Stone 1990, Wagner et al. 1985). The primary threats facing the 25 plant taxa proposed for listing are ongoing and

threatened destruction and adverse modification of habitat by feral animals and competition with alien plants (see Factor E).

Twenty-one of the 25 proposed taxa are variously threatened by feral animals (see Table 1). Animals such as pigs (Sus scrofa) and goats (Capra *hircus*) were introduced by the early Hawaiians (pigs) or more recently by European settlers (goats) for food and/or commercial ranching activities. Over the 200 years following their introduction, their numbers increased and the adverse impacts of feral ungulates on native vegetation have become increasingly apparent. Beyond the direct effect of trampling and grazing native plants, feral ungulates have contributed significantly to the heavy erosion still taking place on most of the main Hawaiian Islands (Cuddihy and Stone

Pigs, which were originally native to Europe, northern Africa, Asia Minor, and Asia, were introduced into Hawaii by the Polynesians. European pigs, introduced to Hawaii by Captain James Cook in 1778, escaped domestication and invaded primarily wet and mesic forests and grasslands of the islands of Kauai, Oahu, Molokai, Maui, and Hawaii. The pigs introduced by the Polynesians were apparently smaller and less destructive to native plants than the European pigs. In addition, it appears that Polynesian pigs were maintained in domestication and were not allowed to establish feral populations. While foraging, pigs root and trample the forest floor, encouraging the establishment of alien plants in the newly disturbed soil. Pigs also disseminate alien plant seeds through their feces and on their bodies, accelerating the spread of alien plants through native forest (Cuddihy and Stone 1990, Stone 1985). Pigs are a major vector in the spread of Psidium

cattleianum (strawberry guava) and Schinus terebinthifolius (Christmas berry), and enhance populations of Rubus argutus (prickly Florida blackberry), which threaten several of the proposed taxa (Cuddihy and Stone 1990, Smith 1985, Stone 1985). Feral pigs also feed on the starchy interiors of tree ferns (Cibotium sp.) and other succulent-stemmed plants (see Factor C). Feral pigs pose an immediate threat to one or more populations of 20 of the proposed taxa, including the only known population of Lobelia gaudichaudii ssp. koolauensis (see Table 1) (HHP 1994c2, 1994c3, 1994d1 to 1994d5, 1994d7, 1994d8, 1994d11, 1994e1 to 1994e4, 1994e7, 1994e10 to 1994e12, 1994f1, 1994f2, 1994g1 to 1994g4, 1994g22, 1994h1, 1994h12 to 1994h14, 1994i7, 1994i10, 1994L5, 1994L6, 1994m20, 1994m22, 1994n3, 1994n5, 1994o1, 1994o13, 1994o35, 1994037, 1994038, 1994043, 1994044, 1994o46, 1994p14, 1994p16, 1994s1, 1994t3, 1994t4, 1994t13, 1994u2, 1994u3, 1994v27, 1994v29, 1994v30, 1994v34 to 1994v36, 1994w3 to 1994w5, 1994aa4, 1994cc1, 1994dd5, 1994dd12, 1994dd13, 1994ee; J. Lau, pers. comm. 1994).

Goats, originally native to the Middle East and India, were successfully introduced to the Hawaiian Islands in 1792. Feral goats now occupy a wide variety of habitats from lowland dry forests to montane grasslands on Kauai, Oahu, Molokai, Maui, and Hawaii, where they consume native vegetation, which may include the proposed taxa (see Factor C), trample roots and seedlings, accelerate erosion, and promote the invasion of alien plants (Stone 1985, van Riper and van Riper 1982). On Oahu, the goat population in the Waianae Mountains area is apparently increasing, becoming an even greater threat to the rare plants that grow there (J. Lau, pers. comm. 1994).