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50 CFR Part 17

Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for 60 Plant Species from the Islands of Maui and Kahoolawe, HI; Final Rule

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018–AH70

Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for 60 Plant Species from the Islands of Maui and Kahoolawe, HI

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), designate critical habitat pursuant to the Endangered Species Act of 1973, as amended (Act), for 60 of 70 listed plant species known historically from the Hawaiian islands of Maui and Kahoolawe. A total of approximately 37,717 hectares (ha) (93,200 acres (ac)) of land on the island of Maui and 1,180 ha (2,915 ac) of land on the island of Kahoolawe fall within the boundaries of the 139 critical habitat units designated for the 60 species. This critical habitat designation requires the Service to consult under section 7 of the Act with regard to actions carried out, funded, or authorized by a Federal agency. Section 4 of the Act requires us to consider economic and other relevant impacts when specifying any particular area as critical habitat. We solicited data and comments from the public on all aspects of the proposed rule, including data on economic and other impacts of the designation.

DATES: This rule becomes effective on June 13, 2003.

ADDRESSES: Comments and materials received, as well as supporting documentation, used in the preparation of this final rule will be available for public inspection, by appointment, during normal business hours at U.S. Fish and Wildlife Service, Pacific Islands Office, 300 Ala Moana Blvd., Room 3–122, P.O. Box 50088, Honolulu, HI 96850–0001.

FOR FURTHER INFORMATION CONTACT: Paul Henson, Field Supervisor, Pacific Islands Office at the above address (telephone 808/541–3441; facsimile 808/541–3470).

SUPPLEMENTARY INFORMATION:

Background

In the List of Endangered and Threatened Plants (50 CFR 17.12(h)), there are 70 plant species that, at the time of listing, were reported from the islands of Maui and/or Kahoolawe (Table 1).

TABLE 1.—SUMMARY OF ISLAND DISTRIBUTION OF 70 SPECIES FROM MAUI AND KAHOOLAWE

Species (common name)	Island distribution						
	Kauai	Oahu	Molokai	Lanai	Maui	Hawaii	NW Isles, Kahoolawe, Niihau
Acaena exigua (liliwai)	H				H		
Adenophorus periens (pendent kihi fern).	C	C	C	R	R	C	
Alectryon macrococcus (mahoe)	C	C	C		C		
Argyroxiphium sandwicense ssp. *macrocephalum* (ahinahina).					C		
Asplenium fragile var. *insulare* (NCN)					C	C	
Bidens micrantha ssp. *kalealaha* (kookoolau).				H	C		
Bonamia menziesii (NCN)	C	C	H	C	C	C	
Brighamia rockii (pua ala)			C	H	H		
Cenchrus agrimonioides (kamanomano)		C		H	C	R	NW Isles (H)
Centaurium sebaeoides (awiwi)	C	C	C	C	C		
Clermontia lindseyana (oha wai)					C	C	
Clermontia oblongifolia ssp. mauiensis (oha wai).				C	C		
Clermontia peleana (oha wai)					H	C	
Clermontia samuelii (oha wai)					C		
Colubrina oppositifolia (kauila)		C			C	C	
Ctenitis squamigera (pauoa)	H	C	C	C	C	H	
Cyanea copelandii ssp. *haleakalaensis* (haha).					C		
Cyanea glabra (haha)					C		
Cyanea grimesiana ssp. *grimesiana* (haha).		C	C	C	C		
Cyanea hamatiflora ssp. *hamatiflora* (haha).					C		
Cyanea lobata (haha)				H	C		
Cyanea mceldowneyi (haha)					C		
Cyrtandra munroi (haiwale)				C	C		
Delissea undulata (NCN)	C				H	C	Ni (H)
Diellia erecta (asplenium-leaved diellia)	H	H	C	H	C	C	
Diplazium molokaiense (NCN)	H	H	H	H	C		
Dubautia plantaginea ssp. *humilis* (naenae).					C		
Flueggea neowawraea (mehamehame)	C	C	H		C	C	
Geranium arboreum (nohoanu)					C		
Geranium multiflorum (nohoanu)					C		
Gouania vitifolia (NCN)		C			H	C	
Hedyotis coriacea (kioele)		H			C	C	
Hedyotis mannii (pilo)			C	C	C		
Hesperomannia arborescens (NCN)		C	C	H	C		

TABLE 1.—SUMMARY OF ISLAND DISTRIBUTION OF 70 SPECIES FROM MAUI AND KAHOOLAWE—Continued

Species (common name)	Island distribution						
	Kauai	Oahu	Molokai	Lanai	Maui	Hawaii	NW Isles, Kahoolawe, Niihau
Hesperomannia arbuscula (NCN)		C			C		
Hibiscus brackenridgei (mao hau hele)	H	C	H	C	C	C	Ka (R)
Ischaemum byrone (Hilo ischaemum)	C	H	C		C	C	
Isodendrion pyrifolium (wahine noho kula).		H	H	H	H	C	Ni (H)
Kanaloa kahoolawensis (kohe malama malama o kanaloa).							Ka (C)
Lipochaeta kamolensis (nehe)					C		
Lysimachia lydgatei (NCN)		H			C		
Mariscus pennatiformis (NCN)	H	H			C	H	NW Isles (C)
Melicope adscendens (alani)					C		
Melicope balloui (alani)					C		
Melicope knudsenii (alani)	C				C		
Melicope mucronulata (alani)			C		C		
Melicope ovalis (alani)					C		
Neraudia sericea (NCN)			C	H	C		Ka (H)
Nototrichium humile (kului)		C			H		
Peucedanum sandwicense (makou)	C	C	C		C		
Phlegmariurus mannii (wawaeiole)	H				C	C	
Phyllostegia mannii (NCN)			C		H		
Phyllostegia mollis (NCN)		C	H		C		
Phyllostegia parviflora (NCN)		C			H	H	
Plantago princeps (laukahi kuahiwi)	C	C	C		C	H	
Platanthera holochila (NCN)	C	H	C		C		
Pteris lidgatei (NCN)		C	H		C		
Remya mauiensis (NCN)					C		
Sanicula purpurea (NCN)		C			C		
Schiedea haleakalensis (NCN)					C		
Schiedea hookeri (NCN)		C			H		
Schiedea nuttallii (NCN)	C	C	C		R		
Sesbania tomentosa (ohai)	C	C	C	H	C	C	Ni (H), Ka (C), NW Isles (C)
Solanum incompletum (popolo ku mai)	H		H	H	H	C	
Spermolepis hawaiiensis (NCN)	C	C	C	C	C	C	
Tetramolopium arenarium (NCN)					H	C	
Tetramolopium capillare (pamakani)					C		
Tetramolopium remyi (NCN)				C	H		
Vigna o-wahuensis (NCN)		H	C	C	C	C	Ni (H), Ka (C)
Zanthoxylum hawaiiense (ae)	C		C	H	C	C	

Key:
C (Current)—population last observed within the past 30 years
H (Historical)—population not seen for more than 30 years
R (Reported)—reported from undocumented observations
NCN—no common name

Eighteen of these species are endemic to the islands of Maui and Kahoolawe, while 42 species are reported from one or more other islands, as well as Maui and/or Kahoolawe. Each of these species is described in more detail below in the section, ''Discussion of Plant Taxa.'' Although we considered designating critical habitat on Maui and Kahoolawe for each of the 70 plant species, for the reasons described below, the final designation includes critical habitat for 60 of 70 plant species. Species that also occur on other islands may have critical habitat designated on other islands in previous or subsequent rulemakings.

The Islands of Maui and Kahoolawe

Maui, the second largest island in Hawaii at 1,888 square kilometers (sq km) (729 square miles (sq mi)) in area, was formed from the remnants of two large shield volcanoes, the older West Maui volcano (1.3 million years) on the west and the larger, but much younger, Haleakala volcano on the east. Stream erosion has cut deep valleys and ridges into the originally shield-shaped West Maui volcano. The highest point on West Maui is Puu Kukui at 1,764 meters (m) (5,787 feet (ft)) elevation, which has an average rainfall of 1,020 centimeters (cm) (400 inches (in)) per year, making it the second wettest spot in Hawaii (Department of Geography 1998). Having erupted just 200 years ago, East Maui's Haleakala crater, reaching 3,055 m (10,023 ft) in elevation, has retained its classic shield shape and lacks the diverse vegetation typical of the older and more eroded West Maui mountain. Rainfall on the slopes of Haleakala is about 89 cm (35 in) per year, with its windward (northeastern) slope receiving the most precipitation. However, Haleakala's crater is a dry cinder desert because it is above the level at which precipitation develops and is sheltered from moisture-laden winds (Gagne and Cuddihy 1999).

The island of Kahoolawe measures about 17.7 km (11 mi) long by 11.3 km (7 mi) wide, comprising some 11,655 ha (28,800 ac). Located in the lee of

Haleakala, the island lies approximately 11 km (6.7 mi) from East Maui. The highest point is the rim of an extinct volcano at 450 m (1,477 ft) above sea level. The estimated annual precipitation is approximately 50 cm (20 in), with most of it falling from November through March. In addition to the low precipitation, Kahoolawe is the windiest of the Hawaiian Islands (Gon *et al.* 1992).

Discussion of Plant Taxa

Species Endemic to Maui or Kahoolawe

Argyroxiphium sandwicense ssp. *macrocephalum* (Ahinahina)

Argyroxiphium sandwicense ssp. *macrocephalum,* a long-lived perennial and a member of the aster family (Asteraceae), is called the Haleakala silversword. It is a distinctive, globe-shaped rosette plant with a dense covering of silver hairs. This subspecies is distinguished from *A. sandwicense* ssp. *sandwicense* by the shape and ratio of the dimensions of the inflorescence (flowering part of plant), the number of ray florets per head, and the combination of its longer, three-angled leaves; its silvery leaf hairs, which completely hide the leaf surface; and its longer achenes (dry fruits) (Carr 1985, 1999a).

This monocarpic (flowers only once, at the end of its lifetime) plant matures from seed to its final stage in approximately 15 to 50 years. The plant remains a compact rosette until it sends up an erect, central flowering stalk, sets seed, and dies. Flowering occurs from June to September, with annual numbers of flowering plants varying dramatically from year to year. Reliable counts of flowering plants were made in 1935 (217 flowered) and in 1941 (815 flowered). Numbers recorded flowering in recent years have ranged from zero in 1970 to 6,632 in 1991. The environmental stimulus for synchronous flowering is as yet unknown. An apparent relationship of the 1991 mass flowering event to stratospheric alteration by the eruption of Pinatubo Volcano in the Philippines has been considered. Investigations are underway by R. Pharis of the University of Calgary and L.L. Loope of the U.S. Geological Survey—Biological Resources Division (USGS–BRD) to explore whether enhanced flowering is related to increased UV–B radiation caused by temporary reduction of stratospheric ozone. Flying insects, especially native bees, moths, flies, bugs, and wasps, many of which are pollinators, are attracted in large numbers to the giant, aromatic inflorescences. *Argyroxiphium sandwicense* ssp. *macrocephalum* cannot fertilize itself and is reliant on insect pollinators for reproduction. Rarely, hybrids between *A. sandwicense* ssp. *macrocephalum* and *Dubautia menziesii* (naenae) have been observed. Primarily found within Haleakala Crater, especially on Puu o Pele and Puu o Maui cinder cones, these hybrid individuals can flower for several years before dying (Carr 1985; Loope and Crivellone 1986; Loope and Medeiros, in press; Service 1997; 57 FR 20772).

Currently, *Argyroxiphium sandwicense* ssp. *macrocephalum* occupies all of its historic range, a 1,000 ha (2,500 ac) area at 2,100 to 3,000 m (6,890 to 9,840 ft) elevation in the crater and outer slopes of Haleakala Volcano, within Haleakala National Park and The Nature Conservancy of Hawaii's (TNCH) Waikamoi Preserve. There are a total of 7 occurrences on Federal and privately owned land, with a total of 39,025 to 44,025 individual plants (Geographic Decision Systems International (GDSI) 2001; Hawaii Natural Heritage Program (HINHP) Database 2001; Loope and Crivellone 1986; Service 1997; TNCH 1998; 57 FR 20772).

The habitat of this species consists primarily of lava flows and otherwise barren, unstable slopes of recent (less than several thousand years old) volcanic cinder cones or in *Deschampsia nubigena* (hair grass) grasslands at elevations between 1,508 and 3,053 m (4,947 and 10,016 ft). Mean annual precipitation is approximately 75 to 250 cm (29.6 to 98.4 in). The substrate has almost no soil development and is subject to frequent formation of ice at night and extreme heating during cloudless days. This species is found in alpine dry shrubland with native species, including *Agrostis sandwicensis* (bent grass), *Dubautia menziesii, Leptecophylla tameiameiae* (pukiawe), *Silene struthioloides* (catchfly), *Tetramolopium humile* (NCN), or *Trisetum glomeratum* (pili uka) (Service 1997; 57 FR 20772; Robert Hobdy, Hawaii Division of Forestry and Wildlife (DOFAW), pers. comm., 2001).

The threats to this species are loss of pollinators caused by the nonnative Argentine ant (*Iridomyrmex humilis*) and yellow jackets (*Vespula pennsylvanica*); native seed-eating and herbivorous insects such as the tephritid fly (*Trupanea cratericola*); limited natural range, which makes it vulnerable to extinction due to catastrophic events, such as a natural disaster; competition from the nonnative plant species *Verbascum thapsus* (mullein); and human impacts (trampling and site degradation). Although goats (*Capra hircus*) and cattle (*Bos taurus*) have been removed from the park, they remain a potential threat (Service 1997; 57 FR 20772).

Clermontia samuelii (Oha wai)

Clermontia samuelii, a short-lived perennial in the bellflower family (Campanulaceae), is a terrestrial shrub with elliptical leaves which are sometimes broader at the tips. *C. s.* ssp. *hanaensis* is differentiated from *C. s.* ssp. *samuelii* by the greenish white to white flowers; longer, narrower leaves with the broadest point near the base of the leaves; and fewer hairs on the lower surface of the leaves. This species is separated from other members of this endemic Hawaiian genus by the size of the flowers and the hypanthium (base of flower) (Lammers 1999; Service 2001).

Little is known about the life history of *Clermontia samuelii.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 2001; 64 FR 48307).

Historically, *Clermontia samuelii* has been reported from Haleakala and from Keanae Valley on the windward side to Manawainui on the leeward (southeastern) side of Haleakala. Currently, *C. samuelii* is known from Papanalahoa Point, Kuhiwa Valley, the ridge north of Palike Stream, Kawaipapa, and Mokulehua Gulch. There are 7 occurrences with 309 individual plants on State and Federal lands within Haleakala National Park, Hanawi Natural Area Reserve (NAR), Hana Forest Reserve, and within the East Maui Watershed Partnership (GDSI 2001, HINHP Database 2001, Medeiros and Loope 1989, Service 2001, Warshauer 1998, 64 FR 48307, R. Hobdy, DOFAW, *in litt.* 2000, Ken Wood, National Tropical Botanical Garden (NTBG), *in litt.* 2000).

Clermontia samuelii is found at elevations between 723 and 2,244 m (2,372 and 7,362 ft). *Clermontia samuelii* ssp. *hanaensis* is found in wet *Metrosideros polymorpha* (ohia) and *Metrosideros polymorpha-Dicranopteris linearis* (uluhe) forest containing one or more of the following associated native plant species: *Adenophorus tamariscinus* (wahine no mauna); *Broussaisia arguta* (kanawao); *Carex alligata* (NCN); *Cheirodendron trigynum* (olapa); *Cibotium* spp. (hapuu); *Diplazium sandwichianum* (hoio); *Dubautia* spp. (naenae); *Hedyotis hillebrandii* (manono); *Hedyotis terminalis* (manono); *Melicope clusiifolia* (kolokolo mokihana); *Melicope* spp. (alani); *Peperomia obovatilimba* (ala ala wai nui); *Psychotria mariniana* (kopiko);

Tetraplasandra oahuensis (ohe mauka); or *Vaccinium* spp. (ohelo). In addition, *Clermontia samuelii* ssp. *samuelii* is found in wet *Metrosideros polymorpha* and *M. polymorpha-Cheirodendron trigynum* forest containing one or more of the following native plant species: *Broussaisia arguta*; *Carex alligata*; *Cibotium* spp.; *Clermontia arborescens* ssp. *waihiae* (oha wai nui); *Clermontia* spp. (oha wai); *Diplazium sandwichianum*; *Dubautia* spp.; *Hedyotis hillebrandii*; *Hedyotis* spp. (NCN); *Melicope* spp.; *Rubus hawaiensis* (akala); or *Vaccinium* spp. (HINHP Database 2001; Service 2001; 64 FR 48307; R. Hobdy pers. comm., 2001; K. Wood, *in litt.* 2000).

Threats to *Clermontia samuelii* ssp. *hanaensis* include habitat degradation and destruction by feral pigs (*Sus scrofa*) and competition with nonnative plant species such as *Hedychium coronarium* (white ginger), *Hedychium gardnerianum* (kahili ginger), *Juncus* spp. (NCN), *Paspalum urvillei* (vasey grass), *Paspalum conjugatum* (Hilo grass), or *Tibouchina herbacea* (glorybush). In addition, two extremely invasive nonnative plant species, *Miconia calvescens* (velvet tree) and *Clidemia hirta* (Koster's curse), are found in nearby areas and may invade this habitat if not controlled. The habitat of *Clermontia samuelii* ssp. *samuelii* was extensively damaged by pigs in the past, and pigs are still a major threat to the populations on State-owned lands. The occurrence within the National Park has been fenced, and pigs have been eradicated. However, due to the large populations of pigs in adjacent areas, the park occurrences must constantly be monitored to prevent further ingress. Competition with nonnative plant species such as *Holcus lanatus* (velvet grass) and *Juncus planifolius* (NCN) is also a major threat to this subspecies. In addition, rats (mainly black rats (*Rattus rattus*)) and slugs (mainly *Milax gagetes*) are known to eat leaves, stems, and fruits of other members of this genus and therefore are a potential threat to both subspecies (Service 2001; 64 FR 48307; K. Wood, *in litt.* 2000).

Cyanea copelandii ssp. *haleakalaensis* (Haha)

Cyanea copelandii ssp. *haleakalaensis,* a short-lived perennial member of the bellflower family (Campanulaceae), is a vine-like shrub with sprawling stems and tan latex (sap). This subspecies is differentiated from *C. c.* ssp. *copelandii* by its shorter elliptical leaves. The species differs from others in this endemic Hawaiian genus by the vine-like stems and the yellowish flowers that appear red caused by the covering of hairs (Lammers 1999; Service 2001).

Little is known about the life history of *Cyanea copelandii* ssp. *haleakalaensis.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 2001; 64 FR 48307).

Historically, *Cyanea copelandii* ssp. *haleakalaensis* was reported from the windward side of Haleakala and from Waikamoi to Kipahulu Valley. Currently, this species is known from 5 occurrences with a total of 204 individuals on Federal and privately owned land within the East Maui Watershed Partnership in Haiku Uka, the ridge above Kuhiwa Valley, and Kipahulu Valley within Haleakala National Park and Hanawi Natural Area Reserve (NAR) (GDSI 2001; HINHP Database 2001; Lammers 1999; Service 2001; Warshauer 1998; 64 FR 48307).

Cyanea copelandii ssp. *haleakalaensis* is found on stream banks or wet scree (a sloping mass of rocks at the base of a cliff) slopes or in forest understory in montane wet or mesic forests dominated by *Acacia koa* (koa) and *Metrosideros polymorpha* at elevations between 616 and 1,411 m (2,021 and 4,630 ft). Associated species include *Broussaisia arguta, Cibotium* spp., *Hedyotis acuminata* (au), *Perrottetia sandwicensis* (olomea), and *Psychotria hawaiiensis* (kopiko ula) (HINHP Database 2001; R. Hobdy, pers. comm., 2001; Service 2001; 64 FR 48307).

The major threats to this species are habitat degradation and destruction by feral pigs; competition with several nonnative plant species; rats; slugs; human activities; and potential extinction caused by random environmental events due to small occurrence sizes (Service 2001; 64 FR 48307).

Cyanea glabra (Haha)

Cyanea glabra, a member of the bellflower family (Campanulaceae), is a short-lived, perennial shrub, with the leaves of juvenile plants deeply pinnately lobed, while those of the adult plants are more or less entire and elliptical. This species is differentiated from others in this endemic Hawaiian genus by the size of the flower and the pinnately lobed juvenile leaves (Lammers 1999; Service 2001).

Little is known about the life history of *Cyanea glabra.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 2001; 64 FR 48307).

Historically, *Cyanea glabra* has been reported from West Maui and on Haleakala, East Maui. Currently, this species is known from a single occurrence of 12 individual plants on privately owned land in Kauaula Valley (GDSI 2001; HINHP Database 2001; 64 FR 48307).

Cyanea glabra is found on soil and rock stream banks in wet lowland forests dominated by *Acacia koa* and *Metrosideros polymorpha,* at elevations between 413 and 1,572 m (1,355 and 5,156 ft). Associated native plants include *Boehmeria grandis* (akolea), *Cheirodendron trigynum, Christella cyatheoides* (kikawaio), *Cibotium* spp., *Clermontia kakeana* (ohai wai), *Coprosma* spp. (pilo), *Diplazium* spp. (NCN), *Dodonaea viscosa* (aalii), *Dubautia plantaginea* (naenae), *Perrottetia sandwicensis, Pipturus albidus* (mamaki), *Psychotria* spp. (kopiko), *Sadleria* spp. (amau), *Touchardia latifolia* (olona), and *Xylosma hawaiiense* (maua) (Service 2001; 64 FR 48307; Joel Lau, HINHP, pers. comm., 2001; HINHP Database 2001; R. Hobdy, pers. comm., 2001).

The threats to this species are slugs; habitat degradation and destruction by feral pigs; flooding; competition with several nonnative plant species; rats; the two-spotted leafhopper (*Saphonia rufofascia*); and extinction caused by random environmental events caused by the small number of individuals in the only remaining occurrence (Service 2001; 64 FR 48307).

Cyanea hamatiflora ssp. *hamatiflora (Haha)*

Cyanea hamatiflora ssp. *hamatiflora,* a short-lived perennial member of the bellflower family (Campanulaceae), is a palm-like tree with tan colored latex. This subspecies is differentiated from the other listed subspecies (*C. hamatiflora* ssp. *carlsonii*) by its longer calyx lobes and shorter individual flower stalks. This species is separated from others in this endemic Hawaiian genus by fewer flowers per inflorescence and narrower leaves (Lammers 1999; Service 2001).

Little is known about the life history of *Cyanea hamatiflora* ssp. *hamatiflora.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 2001; 64 FR 48307).

Historically, *Cyanea hamatiflora* ssp. *hamatiflora* was known from the windward side of Haleakala, stretching from Puu o Kakae to Manawainui. Currently, this species is known from 9

occurrences with a total of 12 individuals within the East Maui Watershed Partnership in Honomanu, Wailuaiki, Kipahulu Valley, Koukouai, and Puu Ahulili, on Federal (Haleakala National Park) and privately owned lands (GDSI 2001; HINHP Database 2001; Service 2001; Warshauer 1998; 64 FR 48307).

Typical habitat for this species is montane wet forest dominated by *Metrosideros polymorpha,* with a *Cibotium* spp. and/or native shrub understory, or closed *Acacia koa-M. polymorpha* wet forest, containing one or more of the following associated native plant species: *Athyrium microphyllum* (akolea), *Broussaisia arguta*, *Cheirodendron trigynum*, *Cyanea aculeatiflora* (haha), *Cyanea kunthiana* (haha), *Dicranopteris linearis*, *Diplazium sandwichianum, Melicope* spp., *Myrsine* spp. (kolea), or *Vaccinium* spp.; and at elevations between 767 and 1,553 m (2,515 and 5,095 ft) (HINHP Database 2001; R. Hobdy, pers. comm., 2001; Service 2001; 64 FR 48307).

The threats to this species are habitat degradation and destruction by feral pigs; landslides; competition with the nonnative plant *Ageratina adenophora* (Maui pamakani); rats; and slugs (Service 2001; 64 FR 48307).

Cyanea mceldowneyi (Haha)

Cyanea mceldowneyi, a member of the bellflower family (Campanulaceae), is a short-lived, unbranched perennial shrub with rough to prickly stems. This species is distinguished from other species of *Cyanea* by the combination of a densely armed trunk; long (4 cm (1.6 in)), white corollas; and leaf blade size and shape (Lammers 1999; Service 2001).

Little is known about the life history of *Cyanea mceldowneyi.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997; 57 FR 20772).

Historically, *Cyanea mceldowneyi* was known from rainforest west of Waikamoi to Honomanu on northwestern Haleakala. Currently, this species is known from 11 occurrences with a total of 36 individuals on State (Makawao Forest Reserve and Hanawi NAR) and privately owned lands within the East Maui Watershed Partnership at Kahakapao Gulch, Opana Gulch, Waikamoi, Puohokamoa, Makapipi, and the flats above Kuhiwa Valley (GDSI 2001; HINHP Database 2001; Lammers 1999; Service 1997; Warshauer 1998; 57 FR 20772).

The habitat of this species is montane wet and mesic forest with mixed *Metrosideros polymorpha-Acacia koa* containing one or more of the following associated native plant species: *Broussaisia arguta*, *Cheirodendron trigynum, Cibotium* spp., *Clermontia arborescens*, Cyrtandra spp. (haiwale), *Dicranopteris linearis*, *Diplazium sandwichianum*, *Hedyotis* spp., or *Melicope clusiifolia*, at elevations between 779 and 1,357 m (2,555 and 4,453 ft) (R. Hobdy, pers. comm., 2001, Service 1997, 57 FR 20772).

The threats to this species are habitat degradation and physical destruction by feral pigs, small number of occurrences and individuals, human activities, and competition with nonnative plant species, especially *Setaria palmifolia* (palmgrass) (Service 1997; 57 FR 20772).

Dubautia plantaginea ssp. *humilis* (Naenae)

Dubautia plantaginea ssp. *humilis*, a short-lived perennial of the aster family (Asteraceae), is a dwarf shrub less than 80 cm (30 in) tall with hairless or strigillose (bulbous-based hairs, all pointing in the same direction) stems. This species differs from other Hawaiian members of the genus by the number of veins in the leaves and by the close resemblance of the leaves to the genus *Plantago*. The subspecies *humilis* differs from the other two subspecies (*D. plantaginea* ssp. *magnifolia* and *D. plantaginea* ssp. *plantaginea*) by having fewer heads per inflorescence, but more florets per head (Carr 1985; Carr 1999b; Service 2001).

Little is known about the life history of *Dubautia plantaginea* ssp. *humilis*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 2001; 64 FR 48307).

Dubautia plantaginea ssp. *humilis* has only been reported from Iao Valley on West Maui. The two occurrences with 60 to 65 individuals in total are on privately owned land (GDSI 2001; HINHP Database 2001; Service 2001; 64 FR 48307).

The typical habitat of the species is wet, barren, steep, rocky, wind-blown cliffs containing one or more of the following associated native plant species: *Bidens* spp. (kookoolau), *Carex* spp. (NCN), *Eragrostis variabilis* (kawelu), *Hedyotis formosa* (NCN), *Lysimachia remyi* (NCN), *Metrosideros polymorpha*, *Pipturus albidus*, *Plantago princeps* (laukahi kuahiwi), or *Pritchardia* spp. (loulu), at elevations between 266 and 1,593 m (873 and 5,226 ft) (HINHP Database 2001; Service 2001; 64 FR 48307; R. Hobdy, pers. comm., 2001).

Threats to *Dubautia plantaginea* ssp. *humilis* include landslides and competition from nonnative plant species. Random environmental events, such as landslides, are a threat because of the limited number of individuals and occurrences and their narrow distribution (Service 2001; 64 FR 48307).

Geranium arboreum (Nohoanu)

Geranium arboreum, a long-lived perennial member of the geranium family (Geraniaceae), is a many branched, spreading, woody shrub about 1.8 to 3.7 m (6 to 12 ft) tall. This species can be distinguished from other *Geranium species* by its red petals with the upper three petals erect and the lower two reflexed, causing the flower to appear curved (Wagner *et al.* 1999).

Geranium arboreum is the only species in its genus that appears to be adapted to bird-pollination. Native honeycreepers appear to be a major pollination vector. *Geranium arboreum* from the southwest area of Haleakala in the Kula Forest Reserve produce seeds that are larger and fuller than seeds from the northwest extension of its distribution. Native honeycreepers are reasonably abundant in both areas. Little else is known about the life history of *Geranium arboreum.* Flowering cycles, other pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Funk 1982, 1988; Service 1997; 57 FR 20772).

The original range and abundance of the species is unknown, but late 19th and early 20th century collections indicate that it once grew on the southern slopes of Haleakala and that its distribution on the northern slopes extended beyond its presently known range. Currently, there are 12 occurrences totaling 158 individuals, within the East Maui Watershed Partnership on State (Kula and Kahikinui Forest Reserves), private, and federally owned or leased (Haleakala National Park) lands. These occurrences are found in Kahua, Kanahau, Waiohuli, Kaipoioi Gulch, Hapapa Gulch, Keauaiwi Gulch, Kalialinui, and south of Puu Luau and east of Puu Nianiau (GDSI 2001; HINHP Database 2001; Service 1997; Warshauer 1998; 57 FR 20772).

Geranium arboreum grows in steep, damp, and shaded narrow canyons and gulches, steep banks, and intermittent streams in *Sophora chrysophylla* (mamane) subalpine dry shrubland or *Metrosideros polymorpha* montane forest containing one or more of the

following associated native plant species: *Dryopteris wallichiana* (io nui); *Dodonaea viscosa; Leptecophylla tameiameiae*; *Rubus hawaiiensis*; or *Vaccinium reticulatum* (ohelo ai), at elevations between 1,451 and 2,184 m (4,760 and 7,164 ft) (R. Hobdy, pers. comm., 2001; Service 1997; 57 FR 20772).

The greatest immediate threat to the survival of this species is encroachment and competition from naturalized, nonnative vegetation, chiefly grasses and trees. Soil disturbance, caused by trampling cattle and rooting by feral pigs, also is a major threat as it destroys plants and facilitates the encroachment of competing species of naturalized plants. Other less important threats include browsing by cattle; fires; and pollen from nonnative pine trees, which at certain times of the year completely covers the stigmas of the geraniums, precluding any fertilization by its own pollen. The small number of individual plants increases the potential for extinction from random environmental events, and the limited gene pool may depress reproductive vigor (Funk 1982, 1988; Service 1997; 57 FR 20772).

Geranium multiflorum (Nohoanu)

Geranium multiflorum, a long-lived member of the geranium family (Geraniaceae), is a perennial many-branched shrub 1 to 3 m (3 to 10 ft) tall. Flowers are in clusters of 25 to 50 and have 5 white petals that are 10 to 15 millimeters (mm) (0.4 to 0.6 in) long with purple veins or bases. This species is distinguished from others of the genus by its white, regularly symmetrical flowers and by the shape and pattern of teeth on its leaf margins (Wagner *et al.* 1999).

Little is known about the life history of *Geranium multiflorum.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997; 57 FR 20772).

Historically, *Geranium multiflorum* was known from Ukulele, Waieleele, and Waianapanapa on East Maui. This species is now known from Federal (Haleakala National Park), State (Hanawi NAR and Koolau Forest Reserve), and private lands within the East Maui Watershed Partnership in Haiku Ula, Kalialinui, Koolau Gap, between East Waiuaki and Kopiliula Streams, near Puu Alaea along Kalapawili Ridge, Kipahulu Valley, Waiakekeehia, and Haleakala Crater. The 13 known occurrences extend over a distance of about 10.5 by 5.5 km (6.5 by 3.5 mi). Due to the inaccessibility of the occurrences, and the difficulty in determining the number of individuals (caused by the plant's multi-branched form), the total number of individuals of this species is not known; however, it probably does not exceed 3,000 plants (GDSI 2001; HINHP Database 2001; R. Hobdy, pers. comm., 2001; Service 1997; Warshauer 1998; 57 FR 20772).

Geranium multiflorum is found in wet or mesic *Metrosideros polymorpha* montane forest or alpine mesic forest, *Leptecophylla tameiameiae* shrubland, *Sophora chrysophylla* subalpine dry forest, open sedge swamps, fog-swept lava flows, or montane grasslands containing one or more of the following associated native plant species: *Coprosma montana* (pilo); *Dryopteris glabra* (hohui); *Dryopteris wallichiana; Hedyotis* spp.; *Rubus hawaiiensis; Sadleria cyatheoides;* or *Vaccinium* spp. (amau), at elevations between 1,499 and 2,710 m (4,918 and 8,890 ft) (HINHP Database 2001; Service 1997; Wagner *et al.* 1999; 57 FR 20772).

The major threat to *Geranium multiflorum* is competition with encroaching nonnative plant species, particularly *Rubus argutus* (prickly Florida blackberry). A potential threat is habitat destruction by feral pigs and goats in unfenced areas (Service 1997; 57 FR 20772).

Kanaloa kahoolawensis (Kohe malama malama o kanaloa)

Kanaloa kahoolawensis, a short-lived perennial member of the legume family (Fabaceae), is a densely branched shrub 0.75 to 1 m (2.5 to 3.5 ft) tall. The leaves are divided into three pairs of leaflets, with a leaf nectary (nectar-bearing gland) at the joint between each pair of leaflets. One to three inflorescences are found in the leaf axils (joint between leaf and stem), developing with the flush of new leaves. The inflorescence is a globose head with 20 to 54 white flowers. No other species of legume in Hawaii bears any resemblance to this species, which is why it is the only one in this genus (Lorence and Wood 1994; Service 2001).

Little is known about the life history of *Kanaloa kahoolawensis.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 2001; 64 FR 48307).

Kanaloa kahoolawensis was unknown to science until its discovery by Steve Perlman and Ken Wood of NTBG in 1992 on a steep rocky spire on the coast of Kahoolawe. The only known location of *K. kahoolawensis* is this rocky stack on the southern coast of Kahoolawe, in an area which is owned by the State of Hawaii. While there are no previous records of the plant, pollen core studies on Oahu revealed a legume pollen that could not be identified but is most likely this species. The pollen cores indicate that this previously unidentified species was a codominant with *Dodonaea viscosa* and *Pritchardia* spp. from before 1210 B.C. to 1565 A.D., at which point *K. kahoolawensis* disappeared from the pollen record and *D. viscosa* and *Pritchardia* spp. declined dramatically. Only one occurrence with two living individuals is known (Athens *et al.* 1992; Athens and Ward 1993; Lorence and Wood 1994; Service 2001; 64 FR 48307; Paul Higashino, Kahoolawe Island Reserve Commission (KIRC), pers. comm., 2000).

The only known habitat is steep rocky talus slopes in mixed coastal shrubland at elevations between 0 and 305 m (0 and 1,000 ft) and containing one or more of the following associated native plant species: *Bidens mauiensis* (kookoolau); *Capparis sandwichiana* (maiapilo); *Melanthera lavarum* (nehe); *Portulaca molokiniensis* (ihi); *Senna gaudichaudii* (kolomona); or *Sida fallax* (ilima) (Service 2001; 64 FR 48307; R. Hobdy, pers. comm., 2001).

The major threats to *Kanaloa kahoolawensis* are landslides and competition with the nonnative plant species *Emilia fosbergii* (pualele) and *Nicotiana glauca* (tree tobacco). Goats played a major role in the destruction of vegetation on Kahoolawe before they were removed, and *K. kahoolawensis* probably survived only because the rocky stack is almost completely separated from the island and inaccessible to goats. Rats are a potential threat to *K. kahoolawensis,* because the species has seeds similar in appearance and presentation to the seeds of the federally endangered *Caesalpinia kavaiensis* (uhiuhi), which are eaten by rats. Rats may have been the cause of the decline of this species over 400 years ago. Trampling and habitat degradation from introduced cats and native seabirds are also potential threats. Random environmental events and reduced reproductive vigor are also threats to this species, because only two individuals are known (Cuddihy and Stone 1990; Lorence and Wood 1994; Service 2001; 64 FR 48307; P. Higashino, pers. comm., 2000).

Lipochaeta kamolensis (Nehe)

Lipochaeta kamolensis, a short-lived perennial herb of the aster family (Asteraceae), has trailing or climbing stems that are woody at the base and reach a length of 0.3 to 3 m (1 to 10 ft). This species is distinguished from others of the genus by the simple leaves, which are pinnately lobed or cut, and by

the size of the flower heads (Wagner *et al.* 1999).

Lipochaeta kamolensis has been observed flowering from December through February, as well as in April. The growing season coincides with the wet season between November and April to May. Plants are deciduous and appear to be metabolically inactive during the dry season. Little else is known about the life history of *L. kamolensis.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are otherwise unknown (Service 1997; 57 FR 20772).

Historically, *Lipochaeta kamolensis* was known from Kamole Gulch, west of Kepuni Gulch, and 7.2 km (11.8 mi) southeast of Ulupalakua Ranch Office. This species still occurs in Kamole Gulch, on State-owned (Department of Hawaiian Home Lands (DHHL)) land. The only known occurrence, which extends over an area of about 40 ha (100 ac), is estimated to contain fewer than 500 individuals (GDSI 2001; HINHP Database 2001; Service 1997; Wagner *et al.* 1999; 57 FR 20772; K. Wood, *in litt.* 1999).

Lipochaeta kamolensis typically grows in gulches or on gentle slopes outside gulches in dry shrubland at elevations between 40 and 602 m (132 and 1,974 ft) and containing one or more of the following associated native plant species: *Dodonaea viscosa; Ipomoea indica* (koali awa); or *Plumbago zeylanica* (iliee) (Service 1997; Wagner *et al.* 1999; 57 FR 20772; R. Hobdy, pers. comm., 2001; K. Wood, *in litt. 1999).*

The major threats to *Lipochaeta kamolensis* are habitat destruction, predation by cattle and goats, competition with nonnative plants such as *Lantana camara* (lantana), fire, and the one occurrence being subject to extinction by random environmental events (Service 1997; 57 FR 20772).

Melicope adscendens (Alani)

Melicope adscendens, a long-lived perennial of the rue family (Rutaceae), is a sprawling shrub with long, slender branches covered with gray hairs when young, which become hairless when older. *Melicope adscendens* is distinguished from other species of the genus by its growth habit, the distinct follicles (chambers) of its fruit, and the persistent (remaining attached) sepals and petals (Stone *et al.* 1999).

Melicope adscendens fruits have been collected in March and July. Little else is known about the life history of *M. adscendens.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997; 59 FR 62346).

Melicope adscendens has been found only on the southwestern slope of Haleakala; two plants, separated by an unspecified distance, were found by Forbes in 1920. Today, there are 16 occurrences on State (Kanaio NAR) and privately owned lands at Puu Ouli and on the border of the Hana and Makawao Districts (GDSI 2001; HINHP Database 2001; Service 1997; 59 FR 62346).

This species typically grows on aa lava (a particular type of lava flow with very sharp edges) with pockets of soil in *Nestegis sandwicensis* (olopua)-*Pleomele auwahiensis* (hala pepe)-*Dodonaea viscosa* lowland mesic forest or open dry forest containing one or more of the following associated native plant species: *Alphitonia ponderosa* (kauila); *Chamaesyce celastroides* var. *lorifolia* (akoko); *Leptecophylla tameiameiae; Osteomeles anthyllidifolia* (ulei); *Pouteria sandwicensis* (alaa); *Santalum ellipticum* (iliahialoe); or *Xylosma hawaiiense* (maua) at elevations between 761 and 1,209 m (2,497 and 3,967 ft) (HINHP Database 2001; Service 1997; 59 FR 62346; R. Hobdy, pers. comm., 2001; K. Wood, *in litt.* 1999).

Major threats are habitat damage and trampling by cattle; competition with nonnative plant species, including *Bocconia frutescens* (NCN), *Lantana camara,* and *Pennisetum clandestinum* (kikuyu grass); and reduced reproductive vigor or extinction from random environmental events caused by the small number of individuals and narrow distribution. Potential threats include habitat degradation and damage to plants by axis deer (*Axis axis*), feral goats, feral pigs, black twig borer (*Xylosandrus compactus*), fire, and ranch activities (HINHP Database 2001; Service 1997; 59 FR 62346).

Melicope balloui (Alani)

Melicope balloui, a long-lived perennial of the rue family (Rutaceae), is a small tree or shrub. New growth has yellowish brown woolly hairs and waxy scales; plant parts later become nearly hairless. *Melicope balloui* is distinguished from other species of the genus by the partially fused carpels of its four-lobed capsule (dry fruit) and usually persistent sepals and petals (Stone *et al.* 1999).

Little is known about the life history of *Melicope balloui.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997; 59 FR 62346).

Melicope balloui has been found only on the northern and southeastern slopes of Haleakala. There are 3 known occurrences with a total of approximately 50 individuals on private and federally owned (Haleakala National Park) lands within the East Maui Watershed Partnership at Puu O Kakae and Palikea Stream (GDSI 2001; HINHP Database 2001; Service 1997; 59 FR 62346; K. Wood, *in litt.* 1999).

Melicope balloui typically grows in mesic to wet forest between 781 and 1,596 m (2,561 and 5,267 ft) in elevation and containing one or more of the following associated native plant species: *Acacia koa; Cibotium chamissoi* (hapuu); *Cibotium glaucum* (hapuu); *Diplazium sandwichianum; Melicope clusiifolia; Metrosideros polymorpha;* or *Sadleria pallida* (amau) (HINHP Database 2001; Service 1997; 59 FR 62346; J. Lau, Hawaii Natural Heritage Program, pers. comm., 2001).

Major threats are habitat degradation and damage to plants by feral pigs and axis deer and reduced reproductive vigor or extinction caused by random environmental events caused by the small number of existing occurrences and individuals. Potential threats include competition with nonnative plant species such as *Clidemia hirta, Paspalum conjugatum, Paspalum urvillei,* and *Psidium cattleianum* (strawberry guava); susceptibility to black twig borer; and predation by rats (HINHP Database 2001; Service 1997; 59 FR 62346).

Melicope ovalis (Alani)

Melicope ovalis, a long-lived perennial of the rue family (Rutaceae), is a tree growing up to 5 m (16 ft) tall. New growth has fine, short, brownish hairs, but soon becomes hairless. Leaves are opposite, leathery, and broadly elliptic. Bruised foliage has an anise odor similar to that of *M. anisata* (mokihana). *Melicope ovalis* is distinguished from other species of the genus by the almost entirely fused carpels of its capsule, its nonpersistent sepals and petals, and its well-developed petioles (leaf stems) (Stone *et al.* 1999).

Little is known about the life history of *Melicope ovalis.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997; 59 FR 62346).

Melicope ovalis has been found only on the eastern and southeastern slopes of Haleakala. There are two occurrences with approximately 200 individuals,

found on federally owned land along Palikea Stream in Haleakala National Park within the East Maui Watershed Partnership (GDSI 2001; HINHP Database 2001; Service 1997; 59 FR 62346; K. Wood, *in litt.* 1999).

This species typically grows in *Acacia koa* and *Metrosideros polymorpha*-dominated montane wet forests along streams at elevations between 753 and 1,537 m (2,469 and 5,042 ft). Associated plant species include: *Broussaisia arguta; Cheirodendron trigynum; Dicranopteris linearis; Dubautia plantaginea; Hedyotis hillebrandii; Labordia hedyosmifolia* (kamakahala); *Machaerina angustifolia* (uki); *Perrottetia sandwicensis;* or *Wikstroemia oahuensis* (akia) (HINHP Database 2001; Service 1997; 59 FR 62346; R. Hobdy, pers. comm., 2001).

Major threats to the only known population are habitat degradation and damage to plants by feral pigs and reduced reproductive vigor and/or extinction caused by random environmental events. Competition with introduced plants such as *Clidemia hirta, Paspalum conjugatum, Psidium cattleianum* and *Rubus rosifolius* (thimbleberry); seed predation by rats; and susceptibility to black twig borer are also threats to this species. Habitat degradation and damage to plants by feral goats and axis deer are potential threats if the integrity of the fence currently surrounding the occurrence is compromised (HINHP Database 2001; Service 1997; 59 FR 62346; K. Wood, *in litt.* 1999).

Remya mauiensis (NCN)

Remya mauiensis is a short-lived perennial member of the aster family (Asteraceae). The genus *Remya* is endemic to the Hawaiian Islands. This species is a small perennial shrub, about 90 cm (3 ft) tall, with many slender, sprawling, or scandent (climbing) to weakly erect branches. It is distinguished from the other two members of the genus by its hairy stems and foliage, leaf shape, and length of the petiole (Wagner *et al.* 1999).

Little is known about the life history of *Remya mauiensis.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997; 56 FR 1450).

Remya mauiensis was collected twice on West Maui by William Hillebrand between 1851 and 1871, and again in 1920 by Charles Forbes, also on West Maui. It was thought to be extinct until its rediscovery in 1971 by L.E. Bishop, W. Gagne, and S. Montgomery on the slopes of Manawainui Gulch, West Maui. Currently, *R. mauiensis* is known from five occurrences on State-owned land within the West Maui Mountains Watershed Partnership at Paupau, Kokuula, Kanaulaiki, and Maunawainui Gulch in the Panaewa section of the West Maui NAR, the West Maui Forest Reserve, and the Manawainui Plant Sanctuary. Because of the sprawling habit of this species, and the often dense growth of the surrounding vegetation, it is difficult to determine the exact number of individuals; however, there is an estimated total of 21 individuals (GDSI 2001; HINHP Database 2001; Service 1997; 56 FR 1450).

Remya mauiensis grows chiefly on steep, north or northeast-facing slopes in mixed mesophytic forests or *Metrosideros polymorpha* montane wet forests containing one or more of the following associated native species: *Alyxia oliviformis* (maile); *Diospyros sandwicensis* (lama); *Diplazium sandwichianum; Dodonaea viscosa; Leptecophylla tameiameiae; Lysimachia remyi; Melicope* spp.; *Microlepia strigosa* (palapalai); *Myrsine lessertiana* (kolea lau nui); *Nestegis sandwicensis; Pleomele auwahiensis; Psychotria mariniana; Wikstroemia* spp. (akia); or *Xylosma hawaiiense* at elevations between 400 and 1,228 m (1,312 and 4,029 ft) (HINHP Database 2001; Service 1997; 56 FR 1450; R. Hobdy, pers. comm., 2001).

This species is threatened by extinction caused by random catastrophic environmental events by virtue of the extremely small size of the occurrences coupled with their limited distribution. The limited gene pool may depress reproductive vigor, or a single environmental disturbance could destroy a significant percentage of the known individuals. However, the primary threat to this species is the loss and degradation of its habitat caused by the introduction of nonnative plants, such as *Adiantum hispidulum* (rough maidenhair fern), Rubus rosifolius, *Schinus terebinthifolius* (Christmas berry), or *Tibouchina herbacea;* human activities; and feral goats and pigs (Service 1997; 56 FR 1450).

Schiedea haleakalensis (NCN)

Schiedea haleakalensis, a short-lived perennial of the pink family (Caryophyllaceae), is a hairless shrub, with slightly fleshy, narrow leaves and a single vein. Flowers are in clusters at the ends of the branches. This species differs from other species of the genus on East Maui by its crowded, hairless inflorescence composed of bisexual flowers (Wagner *et al.* 1999).

Schiedea haleakalensis is gynodioecious (individuals either have only female flowers or only bisexual flowers) and so likely requires cross-pollination by small insects. Small, short-flighted flies and moths have been observed visiting flowers. Fruits and seeds have been observed from August through September. Little else is known about the life history of *S. haleakalensis.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997; 57 FR 20772).

Due to the lack of early collections or sightings, the historical range of *Schiedea haleakalensis* is unknown. This species is known only from Leleiwi Pali and Kaupo Gap in Haleakala National Park within the East Maui Watershed Partnership. The two occurrences are estimated to contain a total of 100 to 200 individuals, which together extend over a total area of 11 ha (28 ac) (GDSI 2001; HINHP Database 2001; Service 1997; 57 FR 20772).

Schiedea haleakalensis typically grows in rock cracks on sheer cliffs adjacent to barren lava and subalpine shrublands and grasslands with cinder, weathered volcanic ash, or in bare lava substrate with little or no soil development and periodic freezing temperatures, and containing one or more of the following associated native plant species: *Artemisia mauiensis* (hinahina), *Bidens micrantha* (kookoolau), *Dubautia menziesii, Leptecophylla tameiameiae, Vaccinium reticulatum,* or *Viola chamissoniana* (pamakani) at elevations between 1,678 and 2,434 m (5,505 and 7,986 ft) (HINHP Database 2001, Service 1997, 57 FR 20772 R. Hobdy, pers. comm., 2001).

The greatest threats to *Schiedea haleakalensis* are fire and other catastrophic events that could severely impact the species due the small number and restricted distribution of remaining individuals and occurrences (Service 1997; 57 FR 20772).

Tetramolopium capillare (Pamakani)

Tetramolopium capillare, a short-lived perennial of the sunflower family (Asteraceae), is a sprawling shrub with stems measuring 50 to 80 cm (20 to 31 in) long and covered with many glands when young. *Tetramolopium capillare* differs from other species of the genus by its very firm leaves with edges rolled under, its solitary flower heads, the color of its disk florets, and its shorter pappus. It differs from *T. remyi,* with which it sometimes grows, by its more sprawling habit and the shorter stalks of its smaller flower heads (Lowrey 1999).

Little is known about the life history of *Tetramolopium capillare.* Flowering

cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Lowrey 1999).

Historically, *Tetramolopium capillare* is known from Lahaina Luna to Wailuku on West Maui. Currently, 5 known occurrences with a total of 166 individuals are known from State (West Maui Forest Reserve) and privately owned lands within the West Maui Mountains Watershed Partnership, south of Kanaha Stream, Kauaula, Ulaula, and Koia (GDSI 2001; Lowrey 1999; Service 1997; 59 FR 49860).

Tetramolopium capillare typically grows on rocky substrates in *Heteropogon contortus* (pili grass) lowland dry forest containing *Dodonaea viscosa* or *Myoporum sandwicense* (naio); or in *Metrosideros polymorpha-Leptecophylla tameiameiae montane mesic* or wet shrubland and wet cliff faces containing one or more of the following associated plant species: *Dodonaea viscosa, Leptecophylla tameiameiaem* or *Metrosideros polymorpha,* at elevations between 131 and 1,432 m (430 and 4,698 ft) (Service 1997; 59 FR 49860; R. Hobdy, pers. comm., 2001).

The major threats to *Tetramolopium capillare* are fires; competition from nonnative plant species, particularly *Lantana camara, Leucaena leucocephala* (koa haole), or *Melinus repens* (natal redtop); and reduced reproductive vigor and/or extinction from random environmental events caused by the small number of existing occurrences and individuals (Service 1997; 59 FR 49860).

Multi-Island Species

Acaena exigua (Liliwai)

Acaena exigua is a small perennial rosette herb in the rose family (Rosaceae) with narrow, fern-like, divided leaves. It is easily hidden among the other low, tufted bog plants with which it grows. It is distinguished from other Hawaiian rose family members by its lack of petals and by the urn-shaped, constricted base of the flower, that encloses the fruit (Wagner *et al.* 1999).

Little is known about the life history of *Acaena exigua.* Its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997; 57 FR 20772).

Historically, *Acaena exigua* was known from Puu Kukui on West Maui and from Mount Waialeale on Kauai. On Maui, *A. exigua* was last seen by Hank Oppenheimer and Steve Perlman in 1999 within the Puu Kukui Watershed Management Area. It has not been seen in the wild since March 2000 (Hank Oppenheimer, Maui Pineapple Company Limited, pers. comm., 2001; Service 1997; 57 FR 20772).

Acaena exigua is known only from montane bogs characterized by a thick peat substrate overlying an impervious clay substrate, with hummocks of sedges and grasses, stunted trees, and shrubs at elevations between 1,178 and 1,764 m (3,865 and 5,787 ft). Associated native species include the sedges and grasses *Carex montis-eeke* (NCN), *Deschampsia nubigena, Dichanthelium cynodon* (NCN), *Dichanthelium hillebrandianum* (NCN), *Dichanthelium isachnoides* (NCN), *Oreobolus furcatus (NCN),* or *Rhynchospora chinensis* (kuolohia), and the shrubs *Lagenifera maviensis* (howaiaulu), *Metrosideros polymorpha, Myrsine* spp., *Vaccinium* spp., or *Viola maviensis* (pamakani) (R. Hobdy, pers. comm., 2001; Service 1997; 57 FR 20772).

The reason for the disappearance of this species is not known. The main current threats to *Acaena exigua,* if it exists, are believed to include small occurrence size; human impacts (collecting and site degradation); consumption of vegetative or floral parts by nonnative slugs and rats; predation and habitat disturbance by feral pigs; and competition with nonnative plant species (Service 1997; 57 FR 20772).

Adenophorus periens (Pendent kihi fern)

Adenophorus periens, a member of the grammitis family (Grammitidaceae) and a short-lived perennial, is a small, pendent, epiphytic (not rooted in the ground) fern. This species differs from others in this endemic Hawaiian genus by having hairs along the pinna (leaflet) margins, by the pinnae being at right angles to the midrib axis, by the placement of the sori (spore-bearing structures) on the pinnae, and by the degree of dissection of each pinna (Linney 1989).

Little is known about the life history of *Adenophorus periens,* which seems to grow only in closed canopy dense forest with high humidity. Its breeding system is unknown, but outbreeding is very likely to be the predominant mode of reproduction. Spores are dispersed by wind, possibly by water, and perhaps on the feet of birds or insects. Spores lack a thick resistant coat which may indicate their longevity is brief, probably measured in days at most. Due to the weak differences between the seasons, there seems to be no evidence of seasonality in growth or reproduction. Additional information on reproductive cycles, longevity, specific environmental requirements, and limiting factors is not known (Linney 1989).

Historically, *Adenophorus periens* was reported from Kauai, Oahu, Lanai, Maui, and the island of Hawaii. Currently, it is known from Kauai, Molokai, and Hawaii. On Maui, it has not been seen in the wild since 1929 (GDSI 2001; HINHP Database 2001; Service 1999; 59 FR 56333).

Nothing is known of the preferred habitat of or native plant species associated with *Adenophorus periens* on the island of Maui (Service 1999; 59 FR 56333).

Nothing is known of the threats to *Adenophorus periens* on the island of Maui (Service 1999; 59 FR 56333).

Alectryon macrococcus (Mahoe)

Alectryon macrococcus, a long-lived perennial member of the soapberry family (Sapindaceae), consists of two varieties, *macrococcus* and *auwahiensis,* both trees with reddish-brown branches and leaves with one to five pairs of sometimes asymmetrical egg-shaped leaflets. The underside of the leaf has dense brown hairs, persistent in A. macrococcus var. auwahiensis but only on leaves of young *A. macrococcus* var. *macrococcus.* The only member of its genus found in Hawaii, this species is distinguished from other Hawaiian members of its family by being a tree with a hard fruit 2.5 cm (1 in) or more in diameter (Service 1997; Wagner *et al.* 1999; 57 FR 20772).

Alectryon macrococcus is a relatively slow-growing, long-lived tree that grows in xeric to mesic sites and is adapted to periodic drought. Little else is known about the life history of *A. macrococcus.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, and specific environmental requirements are unknown (Service 1997; 57 FR 20772).

Historically and currently, *Alectryon macrococcus* var. *macrococcus is* known from Kauai, Oahu, Molokai, and Maui. On Maui, 10 occurrences with a total of 10 individuals are found along the Honokowai Ditch Trail, Launiupoko Valley, and Iao Valley on privately owned land within the West Maui Mountains Watershed Partnership. Currently, *A. macrococcus* var. *auwahiensis* is known from 3 occurrences with 22 individuals on leeward East Maui in Auwahi in the Hana District and on the ridge east of Pahihi Gulch on private and State-owned (Kahikinui Forest Reserve) lands (GDSI 2001; HINHP Database 2001;

Medeiros *et al.* 1986; Service 1997; 57 FR 20772).

The habitat of *Alectryon macrococcus* var. *macrococcus* on Maui is mesic forests with *Antidesma platyphyllum* (hame), *Antidesma pulvinatum* (hame), *Bobea sandwicensis* (ahakea), *Nestegis sandwicensis, Pittosporum confertiflorum* (hoawa), *Pittosporum glabrum* (hoawa), *Pouteria sandwicensis,* or *Xylosma* spp. (maua) at elevations between 1,017 and 3,562 m (1,168 and 3,337 ft). The habitat of *Alectryon macrococcus* var. *auwahiensis* is mesic to wetter mesic and upper dryland forest containing one or more of the following associated native plant species: *Alphitonia ponderosa; Diospyros sandwicensis; Dodonaea viscosa; Osteomeles anthyllidifolia; Pleomele auwahiensis; Pouteria sandwicensis; Santalum ellipticum; Streblus pendulinus* (aiai); or *Xylosma hawaiiense,* at elevations between 333 and 1,210 m (1,092 and 3,969 ft) (HINHP Database 2001; Service 1997; 57 FR 20772; R. Hobdy, pers. comm., 2001; K. Wood, *in litt.* 1999).

The threats to *Alectryon macrococcus* var. *macrococcus* on Maui include feral goats and pigs; nonnative plant species, such as *Melinus minutiflora* (molasses grass), *Pennisetum clandestinum, Psidium cattleianum,* or *Schinus terebinthifolius;* damage from the black twig borer; seed predation by rats and mice (*Mus musculus*); fire; seed predation by insects (probably the endemic microlepidopteran *Prays* cf. *fulvocanella*); loss of pollinators; depressed reproductive vigor; and caused by the very small remaining number of individuals and their limited distribution, the likelihood that a single natural or human-caused environmental disturbance could easily be catastrophic. The threats to *A. macrococcus* var. *auwahiensis* on Maui are damage from the black twig borer; seed predation by rats and mice; habitat degradation by feral pigs, deer, and escaped cattle; seed predation by insects (probably *Prays* cf. *fulvocanella*); nonnative plant species; loss of pollinators; depressed reproductive vigor; and caused by the very small remaining number of individuals and their limited distribution, the likelihood that a single natural or human-caused environmental disturbance could be catastrophic (Service 1997; 57 FR 20772).

Asplenium fragile var. *insulare* (NCN)

Asplenium fragile var. *insulare,* a short-lived perennial member of the spleenwort family (Aspleniaceae), is a fern with a short sub-erect stem with a dull gray or brown main axis with two greenish ridges. This species is most similar to *A. macraei.* The two can be distinguished by the size and shape of the pinnae and the number of sori (spore-bearing structures) per pinna (Wagner and Wagner 1992).

Little life history information is available for *Asplenium fragile* var. *insulare.* Reproductive cycles, longevity, specific environmental requirements, and limiting factors are largely unknown. Researchers have collected information on species composition, extent of cover, and age-class structure in six sub-populations at Pohakuloa Training Area on the island of Hawaii in order to describe the populations. No gametophytes (gamete-producing life stage) were found, and the age-class structure of the sub-populations sampled was determined to be 100 percent reproductive adults because all the sporophytes (spore-producing life stage) had sori on some fronds (Service 1998a; 59 FR 49025).

Asplenium fragile var. *insulare* was known historically and currently from East Maui and the island of Hawaii. Currently, on Maui there are two occurrences with 18 individuals found in Kalialinui within the East Maui Watershed Partnership on private and federally (Haleakala National Park) owned lands (GDSI 2001; Service 1998a; 59 FR 49025).

On Maui, *Asplenium fragile* var. *insulare* is found in streamside hollows and grottos in gulches that occur in mesic to dry subalpine shrubland dominated by *Leptecophylla tameiameiae* and *Sadleria cyatheoides,* with scattered *Metrosideros polymorpha,* between 1,682 and 2,407 m (5,518 and 7,896 ft). Associated native plant species include *Dryopteris wallichiana* and *Grammitis hookeri* (makue lau lii) (Service 1998a; 59 FR 49025; R. Hobdy, pers. comm., 2001).

The primary threat to *Asplenium fragile* var. *insulare* on the island of Maui is the risk of extinction caused by random naturally occurring events due to the small number of existing individuals (Service 1998a; Shaw 1992; 59 FR 49025).

Bidens micrantha ssp. *kalealaha* (Kookoolau)

Bidens micrantha ssp. *kalealaha,* a short-lived member of the aster family (Asteraceae), is an erect perennial herb. This subspecies can be distinguished by the shape of the seeds, the density of the flower clusters, the numbers of ray and disk florets per head, differences in leaf surfaces, and other characteristics (Ganders and Nagata 1999; 57 FR 20772).

Bidens micrantha is known to hybridize with other native *Bidens,* such as *B. mauiensis* and *B. menziesii,* and possibly *B. conjuncta.* Little else is known about the life history of *B. micrantha* ssp. *kalealaha.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, and specific environmental requirements are unknown (Ganders and Nagata 1999; Service 1997; 57 FR 20772).

Historically, *Bidens micrantha* ssp. *kalealaha* was known from Lanai, the south slope of Haleakala on East Maui, and from one location on West Maui. Currently, this species remains only on East Maui in Kahua, Nakula, and Haleakala Crater and Kaupo Gap, on State (Kahikinui Forest Reserve) and Federal (Haleakala National Park) lands within the East Maui Watershed Partnership. There are a total of 4 occurrences with less than a total of 2,000 individuals (Ganders and Nagata 1999; GDSI 2001; HINHP Database 2001; Service 1997; 57 FR 20772).

The habitat of *Bidens micrantha* ssp. *kalealaha* on Maui is blocky lava flows with little or no soil development; deep pit craters; sheer rock walls in open canopy *Metrosideros polymorpha-Acacia koa* forest; montane shrubland; *Sophora chrysophylla* forests or cliff faces, and containing one or more of the following associated native plant species: *Coprosma montana* (pilo); *Dodonaea viscosa; Dubautia platyphylla* (naenae); *Leptecophylla tameiameiae; Santalum haleakalae* (iliahi); or *Vaccinium reticulatum.* In addition, the habitat of *Bidens micrantha* ssp. *kalealaha* is at elevations between 1,317 and 2,565 m (4,321 and 8,414 ft) (Ganders and Nagata 1999; HINHP Database 2001; Service 1997; 57 FR 20772; R. Hobdy, pers. comm., 2001).

The threats to this species on Maui are habitat destruction by feral goats, pigs, and cattle; competition from a variety of invasive plant species; and fire (Service 1997; 57 FR 20772).

Bonamia menziesii (NCN)

Bonamia menziesii, a short-lived perennial member of the morning-glory family (Convolvulaceae), is a vine with twining branches that are fuzzy when young. This species is the only member of the genus that is endemic to the Hawaiian Islands and differs from other genera in the family by its two styles, longer stems and petioles, and rounder leaves (Austin 1999).

Little is known about the life history of *Bonamia menziesii.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and

limiting factors are unknown (Service 1999; 59 FR 56333).

Historically, *Bonamia menziesii* was known from Kauai, Oahu, Molokai, one location on West Maui, and the island of Hawaii. Currently, this species is known from Kauai, Oahu, Lanai, Maui, and Hawaii. On Maui, there are six occurrences containing a total of eight individuals on State (Kanaio NAR) and privately owned lands within the West Maui Mountains Watershed Partnership at Honokawai, Keokea, Haunauhane, and Kanaio (GDSI 2001; HINHP Database 2001; Service 1999; 59 FR 56333; K. Wood, *in litt.* 1999).

Bonamia menziesii on Maui is found on a lava in mixed open dry forest, *Erythrina sandwicensis* (wiliwili) lowland dry forest, or in mesic mixed *Metrosideros polymorpha* forest containing one or more of the following associated native plant species: *Acacia koaia* (koaia); *Achyranthes splendens* (Maui hinahina ewa); *Alphitonia ponderosa; Alyxia oliviformis; Diospyros sandwicensis; Dodonaea viscosa; Lipochaeta rockii* (nehe); *Myoporum sandwicense; Nestegis sandwicensis; Nothocestrum latifolium* (aiea); *Nototrichium* spp. (kului); *Pleomele auwahiensis; Pouteria sandwicensis; Osteomeles anthyllidifolia; Reynoldsia sandwicensis* (ohe); *Santalum ellipticum; Sicyos* spp. (anunu); *Sida fallax;* or *Xylosma hawaiiense,* at elevations between 184 and 906 m (604 and 2,971 ft) (HINHP Database 2001; Service 1999; 59 FR 56333; R. Hobdy, pers. comm., 2001; K. Wood, *in litt.* 1999).

The primary threats to this species on Maui are habitat degradation and possible predation by feral pigs, goats, axis deer, and cattle; competition with a variety of nonnative plant species, particularly *Bocconia frutescens* or *Lantana camara;* and an nonnative beetle (*Physomerus grossipes*) (Service 1999; 59 FR 56333).

Brighamia rockii (Pua ala)

Brighamia rockii, a long-lived perennial member of the bellflower family (Campanulaceae), grows as an unbranched stem-succulent with a thickened stem that tapers from the base. This species is a member of a unique endemic Hawaiian genus with only one other species, found on Kauai, from which it differs by the color of its petals, its longer calyx (fused sepals) lobes, and its shorter flower stalks (Lammers 1999).

Observations of *Brighamia rockii* have provided the following information: The reproductive system is protandrous, meaning male flower parts are produced before female parts, in this case, separated by several days; only five percent of the flowers produce pollen; very few fruits are produced per inflorescence; there are 20 to 60 seeds per capsule; and plants in cultivation have been known to flower at nine months of age. This species has been observed in flower during August. Little else is known about the life history of *B. rockii.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (HINHP Database 2001; Service 1996b; 57 FR 46325).

Historically, *Brighamia rockii* ranged along the northern coast of East Molokai and may possibly have grown on Lanai and Maui. Currently, it is only extant on Molokai (HINHP Database 2001; Lammers 1999; Service 1996b; 57 FR 46325; K. Wood, *in litt.* 2000).

Brighamia rockii occurs in rock crevices on steep sea cliffs, often within the spray zone, in coastal dry to mesic forests and shrublands between 0 and 195 m (0 and 640 ft). Associated plant species include *Diospyros sandwicensis, Psydrax odorata* (alahee), *Osteomeles anthyllidifolia,* and *Scaevola taccada* (naupaka kahakai) (Service 1996b; 57 FR 46325; J. Lau, pers. comm., 2001).

Nothing is known of the threats to *Brighamia rockii* on the island of Maui (Service 1996b; 57 FR 46325).

Cenchrus agrimonioides (Kamanomano, =sandbur, agrimony)

Cenchrus agrimonioides is a short-lived perennial member of the grass family (Poaceae) with leaf blades that are flat or folded and have a prominent midrib. There are two varieties, *C. agrimonioides* var. *laysanensis* and *C. agrimonioides* var. *agrimonioides.* They differ from each other in that var. *agrimonioides* has smaller burs, shorter stems, and narrower leaves. This species is distinguished from others in the genus by the cylindrical to lance-shaped bur and the arrangement and position of the bristles (O'Connor 1999).

Little is known about the life history of *Cenchrus agrimonioides.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown. This species has been observed to produce fruit year-round (Service 1999; 61 FR 53108).

Historically, *Cenchrus agrimonioides* var. *agrimonioides* was known from Oahu, Lanai, the south slope of Haleakala and Ulupalakua on Maui, and (in an undocumented report) the island of Hawaii. Historically, *C. agrimonioides* var. *laysanensis* was known from Laysan, Kure, and Midway, all within what is now the Northwestern Hawaiian Islands National Wildlife Refuge, but has not been seen since 1973. This variety was never known from Maui. Currently, *C. agrimonioides* var. *agrimonioides* is known from Oahu and Maui. On Maui, this variety is known from one occurrence on State-owned land (Kanaio NAR) at Ukumehame and Kanaio, East Maui, containing an unknown number of individuals (Corn 1980; HINHP Database 2001; Service 1999; 61 FR 53108).

Cenchrus agrimonioides var. *agrimonioides* is found in mid-elevation dry forest or *Pleomele-Diospyros* forest associated with *Alyxia oliviformis, Dodonaea viscosa, Osteomeles anthyllidifolia,* or *Santalum ellipticum* at elevations between 471 and 1,091 m (1,544 and 3,579 ft) (HINHP Database 2001; Service 1999; 61 FR 53108; R. Hobdy, pers. comm., 2001).

The major threats to the only known occurrence of *Cenchrus agrimonioides* var. *agrimonioides* on Maui are competition with nonnative plant species, browsing and habitat degradation by goats and cattle and a risk of extinction from naturally occurring events and/or reduced reproductive vigor caused by the small number of existing individuals (Service 1999; 61 FR 53108).

Centaurium sebaeoides (Awiwi)

Centaurium sebaeoides is an annual herb in the gentian family (Gentianaceae) with fleshy leaves and stalkless flowers. This species is distinguished from *C. erythraea* (bitter herb), which is naturalized in Hawaii, by its fleshy leaves and the unbranched arrangement of the flower cluster (Wagner *et al.* 1999).

Centaurium sebaeoides has been observed flowering in April. Flowering may be induced by heavy rainfall. Occurrences are found in dry areas, and plants are more likely to be found following heavy rains. Little else is known about the life history of this plant. Its flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 56 FR 55770).

Historically and currently, *Centaurium sebaeoides* is known from Kauai, Oahu, Molokai, Lanai, and Maui. On Maui, there are 3 occurrences of this species, with a total of more than 50 individuals, on State and privately owned lands at Kahakuloa Head, Lahoole, and Kupaa Gulch (HINHP Database 2001; Service 1999; Wagner *et al.* 1999; 56 FR 55770).

This species typically grows in volcanic or clay soils or on cliffs in windward coastal areas at elevations between 0 and 194 m (0 and 636 ft) and containing one or more of the following associated native plant species: *Bidens mauiensis; Lycium sandwicense* (ohelo kai); *Lysimachia mauritiana* (kolokolo kuahiwi); *Melanthera integrifolia* (nehe); *Panicum torridum* (kakonakona); *Scaevola taccada;* or *Schiedea globosa* (NCN) (HINHP Database 2001; Service 1999; Wagner *et al.* 1999; 56 FR 55770; R. Hobdy, pers. comm., 2001).

The major threats to this species on Maui are habitat degradation by feral goats and cattle, competition from the nonnative plant species *Leucaena leucocephala,* trampling by humans on or near trails, and fire (Service 1999; 56 FR 55770).

Clermontia lindseyana (Oha wai)

Clermontia lindseyana, a short-lived perennial member of the bellflower family (Campanulaceae), is a small, branched tree that grows 2.5 to 6 m (8.2 to 20 ft) tall. *Clermontia lindseyana* is either terrestrial or epiphytic. *Clermontia lindseyana* is easily distinguished from the other species within this genus by several characters: Much larger leaves and flowers; petals similar to sepals; and spreading floral lobes. Rock (1962) commented on the leaves being conspicuously hairy beneath (Cuddihy *et al.* 1983; Lammers 1999).

This species has been observed in fruit from June to October and in flower from February to August. Little else is known about the life history of *Clermontia lindseyana.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (HINHP Database 2001; Service 1996a; 59 FR 10305).

Historically, *Clermontia lindseyana* was known from Maui and the island of Hawaii. The two Maui occurrences are located in Waiopai and Wailaulau Gulches in the Kahikinui and Kula Forest Reserves on State and private lands, and are estimated to total about 330 individuals (GDSI 2001, HINHP Database 2001, Service 1996a, 59 FR 10305; Arthur Medeiros, USGS–BRD, *in litt.* 2000).

On Maui, *Clermontia lindseyana* grows in *Acacia koa* mesic forest containing one or more of the following associated native plant species: *Coprosma* spp.; *Cyrtandra* spp.; *Ilex anomala* (kawau); *Myrsine* spp.; or native fern species, at elevations between 1,142 and 1,870 m (3,747 and 6,134 ft) (HINHP Database 2001; Service 1996a; 59 FR 10305; R. Hobdy, pers. comm., 2001).

The threats to *Clermontia lindseyana* are trampling and grazing by cattle, trampling and browsing by goats, and trampling and rooting by pigs; competition with the nonnative plant *Pennisetum clandestinum;* and consumption of berries, flowers, and vegetation by black rats (Service 1996a; 59 FR 10305).

Clermontia oblongifolia ssp. *mauiensis* (Oha wai)

Clermontia oblongifolia ssp. *mauiensis,* a short-lived perennial member of the bellflower family (Campanulaceae), is a shrub or tree with oblong to lance-shaped leaves with petioles. *Clermontia oblongifolia* is distinguished from other members of the genus by its calyx and corolla, which are similar in color and are each fused into a curved tube that falls off as the flower ages. The species is also distinguished by the leaf shape, the male floral parts, the shape of the flower buds, and the lengths of the leaf and flower stalks, the flower, and the smooth green basal portion of the flower (the hypanthium). *Clermontia oblongifolia* ssp. *mauiensis* is reported from Maui and Lanai, while ssp. *oblongifolia* is only known from Oahu and ssp. *brevipes* is only known from Molokai (Lammers 1988, 1999; 57 FR 20772).

Clermontia oblongifolia ssp. *mauiensis* is known to flower from November to July. Little else is known about the life history of this species. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Rock 1919; Service 1997; 57 FR 20772).

Historically, *Clermontia oblongifolia* ssp. *mauiensis* was known from Lanai and Honomanu Valley on Haleakala, East Maui. Currently, it is known from Lanai and West Maui. This species is currently known from one occurrence with an unknown number of individuals, at Kaulalewelewe on privately owned land within the West Maui Mountains Watershed Partnership (GDSI 2001; HINHP Database 2001; Lammers 1999; Service 1997; 57 FR 20772).

This plant typically grows on the sides of ridges and ridge tops in *Metrosideros polymorpha*-dominated montane wet forests at elevations between 414 and 1,764 m (1,358 and 5,787 ft) and containing one or more of the following associated native plant species: *Cheirodendron* spp. (NCN); *Clermontia* spp.; *Coprosma* spp.; *Dicranopteris linearis; Hedyotis* spp.; *Ilex anomala; Melicope* spp.; or *Myrsine* spp. (HINHP Database 2001; Service 1997; 57 FR 20772; R. Hobdy, pers. comm., 2001).

The only known population of this species on Maui is vulnerable to extinction from a natural or human-caused environmental disturbance caused by its small size; depressed reproductive vigor; competition with the nonnative plant species *Tibouchina herbacea;* and habitat degradation by feral pigs (Service 1997; 57 FR 20772).

Clermontia peleana (Oha wai)

Clermontia peleana, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is an epiphytic shrub or tree that grows on native trees and tree ferns. Two subspecies are recognized: *C. peleana* ssp. *singuliflora* (with greenish-white petals) and *C. peleana* ssp. *peleana* (with blackish-purple petals). This species can be separated from other Hawaiian members of the genus by its epiphytic growth, small triangular green calyx lobes, and single-lipped flowers (Lammers 1999).

Clermontia peleana has been observed in flower during June and November, and in fruit during November. Little else is known about the life history of *C. peleana.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (HINHP Database 2001; Service 1996a; 59 FR 10305).

Clermontia peleana ssp. *singuliflora* was formerly found on the island of Hawaii and on East Maui, but has not been seen in either place since the early 1900s (HINHP Database 2001; Service 1996a; Wagner *et al.* 1999; 59 FR 10305; Lyman Perry, DOFAW, pers. comm., 2000).

Nothing is known of the preferred habitat of or native plant species associated with *Clermontia peleana* on the island of Maui (R. Hobdy, pers. comm., 2001; Service 1996a; 59 FR 10305) or of the threats to *Clermontia peleana* on the island of Maui (Service 1996a; 59 FR 10305).

Colubrina oppositifolia (Kauila)

Colubrina oppositifolia, a member of the buckthorn family (Rhamnaceae), is a long-lived tree with extremely hard, red wood. This species is readily distinguished from the other species in Hawaii by the opposite leaf position, dull leaf surface, and entire leaf margins (Wagner *et al.* 1999).

This species has been observed in fruit and flower in September and June, and in flower during December and January. Little else is known about the

life history of *Colubrina oppositifolia*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (HINHP Database 2001; Service 1996a; 59 FR 10305).

Historically and currently, *Colubrina oppositifolia* is known from Oahu, Maui, and the island of Hawaii. Currently on Maui, there are two occurrences containing one individual each on privately owned land in Honokawai in Lahaina District and in Auwahi in Hana District (GDSI 2001; HINHP Database 2001; Service 1996a; Warshauer 1998; 59 FR 10305).

The habitat of this species is lowland dry and mesic forest dominated by *Diospyros sandwicensis,* at elevations between 192 and 929 m (630 and 3,047 ft) and containing one or more of the following associated native plant species: *Bidens micrantha* ssp. *micrantha* (kookoolau); *Canavalia* spp. (awikiwiki); *Dodonaea viscosa; Freycinetia arborea* (ieie); *Metrosideros polymorpha; Microlepia strigosa; Pleomele auwahiensis; Psydrax odorata; Reynoldsia sandwicensis;* or *Wikstroemia* spp. (HINHP Database 2001; Service 1996a; 59 FR 10305; R. Hobdy, pers. comm., 2001).

The threats to this species on Maui are habitat destruction by feral pigs, competition with the nonnative plants *Lantana camara* and *Schinus terebinthifolius,* the black twig borer, Chinese rose beetle (*Adoretus sinicus*), fire; and its small number of occurrences and limited distribution (Service 1996a; 59 FR 10305).

Ctenitis squamigera (Pauoa)

Ctenitis squamigera is a short-lived perennial of the woodfern family (Dryopteridaceae). *Ctenitis squamigera* can be readily distinguished from other Hawaiian species of *Ctenitis* by the dense covering of tan-colored scales on its frond (Degener and Degener 1957; Wagner and Wagner 1992).

Little is known about the life history of *Ctenitis squamigera.* Its reproduction cycles, dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1998a; 59 FR 49025).

Historically, *Ctenitis squamigera* was recorded from the islands of Kauai, Oahu, Molokai, Lanai, Maui, and Hawaii. It is currently found on Oahu, Lanai, Molokai, and Maui. On Maui, there are 12 occurrences with 41 individuals on State (West Maui Forest Reserve) and privately owned lands at Honolua, Kahana, Honokawai, Wahikuli, Kapilau Ridge, Paupau, and Hukoula within the West Maui Mountains Watershed Partnership (GDSI 2001; HINHP Database 2001; Service 1998a; 59 FR 49025; J. Lau *in litt.* 2000; J. Lau, pers. comm., 2000; H. Oppenheimer, *in litt.* 2000; K. Wood, pers. comm., 2000).

This species is found in the forest understory of *Metrosideros polymorpha* montane wet forest or diverse mesic forest at elevations between 74 and 1,593 m (243 and 5,226 ft) and containing one or more of the following native plant species: *Alyxia oliviformis; Antidesma* spp. (hame); *Bobea* spp. (ahakea); *Canavalia* spp.; *Coprosma* spp.; *Dicranopteris linearis; Doodia* spp. (okupukupu lauii); *Dryopteris* spp. (NCN); *Freycinetia arborea; Hedyotis terminalis; Hibiscus kokio* ssp. *kokio* (kokio); *Myrsine* spp.; *Peperomia* spp. (ala ala wainui); *Pittosporum* spp. (hoawa); *Pleomele* spp. (hala pepe); *Pritchardia* spp.; *Psychotria* spp.; *Remya mauiensis; Sadleria* spp.; *Schiedea pubescens* var. *pubescens* (NCN); or *Xylosma* spp. (HINHP Database 2001; Service 1998a; 59 FR 49025; R. Hobdy, pers. comm., 2001; H. Oppenheimer, pers. comm., 2000).

The primary threats to *Ctenitis squamigera* are habitat degradation by feral pigs, goats, and axis deer; competition with nonnative plant species, especially *Psidium cattleianum* and *Schinus terebinthifolius;* fire; and extinction from naturally occurring events caused by the small number of existing occurrences and individuals (Service 1998a; 59 FR 49025).

Cyanea grimesiana ssp. *grimesiana* (Haha)

Cyanea grimesiana ssp. *grimesiana,* a short-lived member of the bellflower family (Campanulaceae), is a perennial shrub with pinnately divided leaves. This species is distinguished from others in this endemic Hawaiian genus by the pinnately lobed leaf margins and the width of the leaf blades. This subspecies is distinguished from the other two subspecies by the shape and size of the calyx lobes, which overlap at the base (Lammers 1990).

On Molokai, flowering plants have been reported in July and August. Little else is known about the life history of *Cyanea grimesiana* ssp. *grimesiana.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 61 FR 53108).

Historically and currently, *Cyanea grimesiana* ssp. *grimesiana* is known from Oahu, Molokai, Lanai, and scattered locations on Maui. Currently on Maui, there are two occurrences with a total of five individuals on privately owned land in Iao Valley and Kapilau Ridge (GDSI 2001; HINHP Database 2001; Service 1999; 61 FR 53108).

This species is typically found on rocky or steep slopes of stream banks in wet forest gulch bottoms often dominated by *Metrosideros polymorpha* at elevations between 312 and 1,617 m (1,024 and 5,305 ft) and containing one or more of the following associated native plant species: *Antidesma* spp.; *Bobea* spp.; *Myrsine* spp.; *Nestegis sandwicensis; Psychotria* spp.; or *Xylosma* spp. (Service 1999; 61 FR 53108; R. Hobdy, pers. comm., 2001).

The threats to this species on Maui are habitat degradation and/or destruction caused by axis deer, goats, and pigs; competition with various nonnative plants; random naturally occurring events that could cause extinction caused by the small number of existing individuals; trampling by hikers; landslides; rats; and slugs (Service 1999; 61 FR 53108).

Cyanea lobata (Haha)

Cyanea lobata, a short-lived member of the bellflower family (Campanulaceae), is a sparingly branched perennial shrub with smooth to somewhat rough stems and oblong, irregularly lobed leaves. This species is distinguished from other species of *Cyanea* by the size of the flower and the irregularly lobed leaves with petioles (Lammers 1990).

Cyanea lobata is known to flower from August to February, even in individuals as small as 50 cm (20 in) in height. Little else is known about the life history of *Cyanea lobata.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Degener 1936; Rock 1919; Service 1997; 57 FR 20772).

Historically, *Cyanea lobata* was known from Lanai and West Maui. It is no longer extant on Lanai. On Maui, there are currently 5 occurrences with a total of 12 individuals on privately owned land within the West Maui Mountains Watershed Partnership at Kaulalewelewe, Honolowai, Honokohau, and Waikapu (GDSI 2001; HINHP Database 2001; Lammers 1999; Service 1997; 57 FR 20772).

This species has been seen and collected on steep stream banks in deep shade in wet forest at elevations between 204 and 1,530 m (669 and 5,020 ft) and containing one or more of the following associated native plant species: *Antidesma* spp.; *Athyrium* spp. (akolea); *Clermontia kakeana; Cyrtandra* spp.; *Freycinetia arborea; Metrosideros polymorpha; Morinda trimera* (noni

kuahiwi); *Peperomia* spp.; *Pipturus albidus; Pleomele* spp.; *Psychotria* spp.; *Touchardia latifolia;* or *Xylosma* spp. (HINHP Database 2001; Lammers 1999; Service 1997; 57 FR 20772; R. Hobdy, pers. comm., 2001).

The threats to this species on Maui are habitat degradation by feral pigs, depressed reproductive vigor, and natural or human-caused environmental disturbance that could easily be catastrophic caused by the small number of remaining individuals and the limited and scattered distribution of the species (Service 1997; 57 FR 20772).

Cyrtandra munroi (Haiwale)

Cyrtandra munroi, a short-lived perennial and member of the African violet family (Gesneriaceae), is a shrub with opposite, elliptic to almost circular leaves that are sparsely to moderately hairy on the upper surface and covered with velvety, rust-colored hairs underneath. This species is distinguished from other species of the genus by the broad opposite leaves, the length of the flower cluster stalks, the size of the flowers, and the amount of hair on various parts of the plant (Wagner *et al.* 1999).

The reproductive biology of some species of *Cyrtandra* has been studied, but not on *C. munroi* specifically. Studies of other members of the genus suggest that a specific pollinator may be necessary for successful pollination. Seed dispersal may be via birds that eat the fruits. Flowering time, longevity of plants and seeds, specific environmental requirements, and other limiting factors are unknown (Service 1995b; 57 FR 20772).

Cyrtandra munroi was historically and is currently known from Lanai and West Maui. Currently on Maui, there are 5 occurrences with a total of approximately 1,000 individuals on private and State (West Maui Forest Reserve) owned lands within the West Maui Mountains Watershed Partnership in Kahanaiki Gulch, Pulepule Gulch, Honokahua Gulch, along Makamakaole Stream, and Hahakea (GDSI 2001; HINHP Database 2001; Service 1995b; Wagner *et al.* 1999; 57 FR 20772).

The habitat of this species is rich, moist to wet, moderately steep talus slopes in lowland wet *Metrosideros polymorpha* forest at elevations between 390 and 1,108 m (1,280 and 3,635 ft) and containing one or more of the following associated native plant species: *Alyxia oliviformis; Bobea* spp.; *Clermontia* spp.; *Coprosma* spp.; *Cyrtandra* spp.; *Diospyros* spp. (lama); *Freycinetia arborea; Hedyotis acuminata; Melicope* spp.; *Myrsine* spp.; *Perrottetia sandwicensis; Pipturus* spp. (mamaki); *Pittosporum* spp.; *Pouteria sandwicensis; Psychotria* spp.; *Sadleria* spp.; *Scaevola* spp. (naupaka); *Sicyos* spp.; *Strongylodon ruber* (nuku iiwi); *Xylosma* spp.; or *Zanthoxylum kauense* (ae) (HINHP Database 2001; Service 1995b; 57 FR 20772; R. Hobdy, pers. comm., 2001).

The threats to this species on Maui are from competition with the nonnative plant species *Melinis minutiflora, Paspalum conjugatum, Pluchea carolinensis* (sourbush), *Psidium cattleianum,* and *Rubus rosifolius;* loss of appropriate pollinators; a very small number of extant individuals which can cause depressed reproductive vigor; and the effects of random environmental events that could easily be catastrophic caused by the small number of occurrences on Maui (Service 1995b; 57 FR 20772).

Delissea undulata (NCN)

Delissea undulata, a member of the bellflower family (Campanulaceae) and a short-lived perennial, is an unbranched, palm-like, woody-stemmed tree with a dense cluster of leaves at the tip of the stem. One or two knob-like structures often occur on the back of the flower tube. Three subspecies, all but the last of which are considered extinct, may be separated on the basis of leaf shape and margin characters: In *D. undulata* var. *kauaiensis,* the leaf blades are oval and flat-margined with sharp teeth; in *D. undulata* var. *niihauensis,* the leaf blades are heart shaped and flat-margined with shallow, rounded teeth; and in *D. undulata* var. *undulata,* the leaf blades are elliptic to lance-shaped and wavy-margined with small, sharply pointed teeth. This species is separated from the other closely related members of the genus by its large flowers and berries and broad leaf bases. *Delissea undulata* ssp. *undulata* is the only subspecies known from Maui (Lammers 1990).

Delissea undulata var. *undulata* has been observed in fruit and flower during December. Little else is known about the life history of *D. undulata* var. *undulata.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (HINHP Database 2001; Service 1996a; 61 FR 53124).

Delissea undulata var. *undulata* was known from southwestern Maui, western Hawaii, and Niihau. Currently it occurs on Kauai and the island of Hawaii (GDSI 2001; HINHP Database 2001; Service 1996a; 61 FR 53124; Linda Pratt, USGS-BRD, pers. comm., 2001; K. Wood, pers. comm., 2001).

Nothing is known of the preferred habitat of or native plant species associated with *Delissea undulata* var. *undulata* on the island of Maui (Service 1996a; 61 FR 53124; R. Hobdy, pers. comm., 2001) or of the threats to *Delissea undulata* var. *undulata* on the island of Maui (Service 1996a; 61 FR 53124).

Diellia erecta (Asplenium-leaved diellia)

Diellia erecta, a short-lived perennial fern in the spleenwort family (Aspleniaceae), grows in tufts of three to nine lance-shaped fronds emerging from a rhizome covered with brown to dark gray scales. This species differs from other members of the genus in having brown or dark gray scales usually more than 2 cm (0.8 in) in length, fused or separate sori along both margins, shiny black midribs that have a hardened surface, and veins that do not usually encircle the sori (Degener and Greenwell 1950; Smith 1934; Wagner 1952).

Little is known about the life history of *Diellia erecta.* Reproduction cycles, dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 59 FR 56333).

Historically, *Diellia erecta* was known on Kauai, Oahu, Molokai, Lanai, Maui, and the island of Hawaii. Currently, it is known from Kauai, Molokai, Maui, and Hawaii. On Maui, there are 5 known occurrences with a total of 35 individual plants on State (West Maui Forest Reserve, Manawainui Plant Sanctuary, and Department of Hawaiian Home Lands) and privately owned lands within the West Maui Mountains Watershed Partnership in Iao Valley, Hanaulaiki, Manawainui Gulch, near Polipoli in Kamaole, and west of Waiopai Gulch (GDSI 2001; HINHP Database 2001; Service 1999; 59 FR 56333).

This species is found in steep slopes or gulch sides in deep shade in *Acacia koa-Metrosideros polymorpha* low-to mid-elevation mesic forests between 338 and 1,744 m (1,109 and 5,722 ft) and containing one or more of the following associated native plant species: *Coprosma* spp.; *Dodonaea viscosa; Dryopteris unidentata* (akole); *Leptecophylla tameiameiae; Melicope* spp.; *Myrsine* spp.; *Osteomeles anthyllidifolia;* or *Psychotria* spp. (HINHP Database 2001; Service 1999; 59 FR 56333; R. Hobdy, pers. comm., 2001).

The major threats to *Diellia erecta* on Maui are habitat degradation by pigs, goats, and cattle; competition with nonnative plant species, including

Blechnum occidentale (NCN); and random naturally occurring events that could cause extinction and/or reduced reproductive vigor caused by the small number of existing individuals (Service 1999; 59 FR 56333).

Diplazium molokaiense (NCN)

Diplazium molokaiense, a short-lived perennial member of the woodfern family (Dryopteridaceae), has a short prostrate rhizome and green or straw-colored leaf stalks with thin-textured fronds. This species can be distinguished from other species of *Diplazium* in the Hawaiian Islands by a combination of characteristics, including venation pattern, the length and arrangement of the sori, frond shape, and the degree of dissection of the frond (Wagner and Wagner 1992).

Little is known about the life history of *Diplazium molokaiense.* Reproductive cycles, dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1998a; 59 FR 49025).

Historically, *Diplazium molokaiense* was found on Kauai, Oahu, Molokai, Lanai, and East and West Maui. Currently, this species is only known from Maui. Four occurrences with a total of 23 individuals are found on State (Kula and Kahikinui Forest Reserves) and privately owned lands within the East Maui Watershed Partnership near Polipoli in Kamaole, between Kahakapao Gulch and Puu O Kakae, Honomanu, and Waiopai Gulch (GDSI 2001; HINHP Database 2001; Service 1998a; Warshauer 1998; 59 FR 49025).

This species occurs near water courses, often in proximity to waterfalls, in lowland or montane mesic *Metrosideros polymorpha-Acacia koa* forest at elevations between 273 and 1,917 m (896 and 6,289 ft) (HINHP Database 2001; Service 1998a; 59 FR 49025; R. Hobdy, pers. comm., 2001).

The primary threats on Maui are habitat degradation by feral goats, cattle, pigs, and axis deer; competition with nonnative plant species; decreased reproductive vigor; and extinction from randomly occurring natural events caused by the small number of occurrences and individuals (HINHP Database 2001; Service 1998a; 59 FR 49025).

Flueggea neowawraea (Mehamehame)

Flueggea neowawraea, a long-lived perennial member of the spurge family (Euphorbiaceae), is a large tree with white oblong pores covering its scaly, pale brown bark. This species is the only member of the genus found in Hawaii and can be distinguished from similar Hawaiian species in the family by its hairless whitish lower leaf surfaces and round fruits (Hayden 1999; Linney 1982; Neal 1965; Service 1999).

Individual trees of *Flueggea neowawraea* bear only male or female flowers, and must be cross-pollinated from a different tree to produce viable seed. Little else is known about the life history of *F. neowawraea.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Hayden 1999; Service 1999; 59 FR 56333).

Historically, *Flueggea neowawraea* was known from the islands of Oahu, Kauai, Molokai, and Hawaii. Currently, occurrences are known from Kauai, Oahu, East Maui, and Hawaii. On Maui, there are four occurrences on State (DHHL) and privately owned lands at Auwahi, and above Lualailua and Alena (GDSI 2001; HINHP Database 2001; Service 1999; 59 FR 56333; Mahealani Kaiaokamalie, Ulupalakua Ranch, *in litt.* 2000).

Flueggea neowawraea occurs in dry or mesic forest at elevations between 633 and 971 m (2,078 and 3,186 ft) and containing one or more of the following associated native plant species: *Alectryon macrococcus; Antidesma pulvinatum; Bobea timonioides* (ahakea); *Charpentiera* spp. (papala); *Diplazium sandwichianum; Diospyros* spp.; *Myrsine lanaiensis* (kolea); *Nesoluma polynesicum* (keahi); *Nestegis sandwicensis; Pleomele auwahiensis; Pleomele* spp.; *Pouteria sandwicensis; Psydrax odorata; Rauvolfia sandwicensis* (hao); or *Tetraplasandra* spp. (oheohe) (HINHP Database 2001; Service 1999; 59 FR 56333; R. Hobdy, pers. comm., 2001).

The threats to the populations on Maui are the black twig borer; habitat degradation by feral pigs, goats, deer, and cattle; competition with nonnative plant species; depressed reproductive vigor; the risk of extinction from a random environmental event caused by the small number of individuals; and predation of the fruit by rats (HINHP Database 2001; Service 1999; 59 FR 56333).

Gouania vitifolia (NCN)

Gouania vitifolia, a member of the buckthorn family (Rhamnaceae) and a short-lived perennial, is a climbing shrub with tendriled flowering branches. This species differs from other members of its genus by having flowering branches with a tendril and coarsely wavy to toothed leaf margins (Wagner *et al.* 1999).

In winter and late spring, the main vine of *Gouania vitifolia* produces new young side shoots which soon die. Plants have been observed flowering from late November to January, but flowering probably depends on precipitation. Little else is known about the life history of *G. vitifolia.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1998b; 59 FR 32932).

Historically, *Gouania vitifolia* was known from West Maui, the Kau District of the island of Hawaii, and Oahu. The species currently occurs on Oahu and on the island of Hawaii (GDSI 2001; Service 1998b; 59 FR 32932; Jon Giffin, DOFAW, *in litt.* 2000).

On Maui, *Gouania vitifolia* typically grows on the sides of ridges and gulches in dry to mesic forests at elevations between 155 and 1,326 m (509 and 4,350 ft). Associated plant species include: *Bidens* spp.; *Carex meyenii* (NCN); *Chamaesyce* spp. (akoko); *Diospyros sandwicensis; Dodonaea viscosa; Erythrina sandwicensis; Hedyotis* spp.; *Hibiscus* spp.; *Melicope* spp.; *Nestegis sandwicensis; Pipturus albidus; Psychotria* spp.; or *Urera glabra* (opuhe) (Service 1998b; 59 FR 32932; J. Lau, pers. comm., 2001).

Nothing is known of the threats to *Gouania vitifolia* on the island of Maui (Service 1998b; 59 FR 32932).

Hedyotis coriacea (Kioele)

Hedyotis coriacea, a member of the coffee family (Rubiaceae), is a small, short-lived perennial shrub with leathery leaves which are generally elliptic to oblong in shape, 3 to 8 cm (1.2 to 3.1 in) long and usually 1.5 to 3 cm (0.6 to 1.2 in) wide. This species is distinguished from others of the genus by its small, triangular calyx lobes, which do not enlarge in fruit, and the combination of capsules which are longer than wide and flower buds which are square in cross-section (Wagner *et al.* 1999).

Little is known about the life history of *Hedyotis coriacea.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997; 57 FR 20772).

Historically, *Hedyotis coriacea* was known from Oahu and the island of Hawaii. Considered extinct on all islands in recent years, this species was discovered in 1990 by Steve Perlman in the State-owned Lihau section of the West Maui NAR and in 1991 on the 1859 lava flow in the Pohakuloa Training Area, island of Hawaii. Currently, only a single individual is known from West Maui on State-owned

land within the West Maui Mountains Watershed Partnership (GDSI 2001; HINHP Database 2001; Service 1997; 57 FR 20772).

Hedyotis coriacea is found on steep, rocky slopes in dry lowland *Dodonaea viscosa*-dominated shrublands at elevations between 110 and 937 m (361 and 3,074 ft) and containing one or more of the following associated native plant species: *Bidens menziesii* (kookoolau); *Gouania hillebrandii* (NCN); *Melanthera lavarum; Myoporum sandwicense; Schiedea menziesii* (NCN); or *Sida fallax* (HINHP Database 2001; Service 1997; 57 FR 20772; R. Hobdy, pers. comm., 2001).

The single remaining individual of *Hedyotis coriacea* on Maui is threatened by extinction from a random naturally occurring event (Service 1997; 57 FR 20772).

Hedyotis mannii (Pilo)

Hedyotis mannii, a member of the coffee family (Rubiaceae), is a short-lived perennial plant with smooth, usually erect stems 30 to 60 cm (1 to 2 ft) long, which are woody at the base and four-angled or winged. This species' growth habit; its quadrangular or winged stems; the shape, size, and texture of its leaves; and its dry capsule, which opens when mature, separate it from other species of the genus (Wagner *et al.* 1999).

Little is known about the life history of *Hedyotis mannii.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1996b; 57 FR 46325).

Currently and historically, *Hedyotis mannii* is known from Lanai, West Maui, and Molokai. On Maui, there is a single occurrence of approximately 20 individuals located on private land in Kauaula Valley (GDSI 2001; Service 1996b; 57 FR 46325; K. Wood, *in litt.* 2000).

The occurrence on Maui is found on basalt cliffs along stream banks in *Metrosideros polymorpha-Dicranopteris linearis* montane wet forest at elevations between 340 and 1,593 m (1,115 and 5,226 ft) and containing one or more of the following associated native plant species: *Boehmeria grandis; Carex meyenii; Cyanea* spp. (haha); *Cyrtandra grayi* (haiwale); *Cyrtandra hawaiensis* (haiwale); *Cyrtandra platyphylla* (ilihia); *Hedyotis acuminata; Isachne distichophylla* (ohe); *Machaerina* spp. (uki); *Phyllostegia* spp. (NCN); *Pipturus albidus; Psychotria spp.; Touchardia latifolia;* or *Urera glabra* (Service 1996b; 57 FR 46325; R. Hobdy, pers. comm., 2001; K. Wood, *in litt.* 2000).

Hedyotis mannii on Maui is threatened by landslides; competition with the nonnative plant species *Ageratina adenophora, Buddleia asiatica* (butterfly bush), *Clidemia hirta, Pluchea carolinensis* (sourbush), and *Rubus rosifolius;* and the low number of individuals which makes it extremely vulnerable to extinction by random naturally occurring events (Service 1996b; 57 FR 46325; K. Wood, *in litt.* 2000).

Hesperomannia arborescens (NCN)

Hesperomannia arborescens, a long-lived perennial of the aster family (Asteraceae), is a small shrubby tree that usually stands 1.5 to 5 m (5 to 16 ft) tall. This member of an endemic Hawaiian genus differs from other *Hesperomannia* species in having the following combination of characteristics: Erect to ascending flower heads; thick flower head stalks; and usually hairless and relatively narrow leaves (Wagner *et al.* 1999).

This species has been observed in flower from April through June and in fruit during March and June. Little else is known about the life history of *Hesperomannia arborescens.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1998b; 59 FR 14482).

Hesperomannia arborescens was formerly known from Oahu, Molokai, and Lanai. This species is now known from Oahu, Molokai, and Maui. There are four occurrences with a total of six individuals on State (Kahukuloa section of the West Maui NAR) and privately owned lands in Honokohau and Lanilii within the West Maui Mountains Watershed Partnership (GDSI 2001; HINHP Database 2001; Service 1998b; 59 FR 14482).

Hesperomannia arborescens is found on slopes or ridges in lowland mesic or wet forest at elevations between 346 and 1,422 m (1,135 and 4,665 ft) and containing one or more of the following associated native plant species: *Antidesma* spp.; *Bobea* spp.; *Cheirodendron* spp.; *Clermontia* spp.; *Cibotium* spp.; *Coprosma* spp.; *Dicranopteris linearis; Freycinetia arborea; Isachne distichophylla; Machaerina* spp.; *Melicope* spp.; *Metrosideros polymorpha; Myrsine sandwicensis* (kolea); *Pipturus* spp.; *Psychotria* spp.; or *Sadleria* spp. (HINHP Database 2001; Service 1998b; 59 FR 14482; R. Hobdy, pers. comm., 2001).

The major threats to *Hesperomannia arborescens* on Maui are habitat degradation by feral pigs and goats; competition with nonnative plant species; impact by humans; and extinction caused by random environmental events or reduced reproductive vigor caused by the small number of remaining individuals (HINHP Database 2001; Service 1998b; 59 FR 14482).

Hesperomannia arbuscula (NCN)

Hesperomannia arbuscula, a long-lived perennial member of the aster family (Asteraceae), is a small shrubby tree, 2 to 3.3 m (7 to 11 ft) tall. This species can be distinguished from other members of the genus by the erect flower heads and the leaves, usually hairy beneath, which are one to two times as long as wide (Wagner *et al.* 1999).

Hesperomannia arbuscula usually flowers in the spring, depending on precipitation. Seeds mature in about 6 weeks and trees live about 10 to 15 years. Little else is known about the life history of *H. arbuscula.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1998b; 56 FR 55770).

Historically and currently, *Hesperomannia arbuscula* is known from Oahu and West Maui. On Maui, there are 8 occurrences with a total of 37 individuals, on privately owned land along Waihee Stream and Nakalaloa within the West Maui Mountains Watershed Partnership (GDSI 2001; HINHP Database 2001; Service 1998b; 56 FR 55770; K. Wood, *in litt.* 1999).

Hesperomannia arbuscula typically grows on steep forested slopes and ridges in mesic forest dominated by *Metrosideros polymorpha* or *Diospyros sandwicensis* at elevations between 354 and 1,453 m (1,161 and 4,767 ft) and containing one or more of the following associated native plant species: *Alyxia oliviformis; Bidens* spp.; *Cheirodendron* spp.; *Clermontia* spp.; *Cyanea spp.; Psychotria* spp.; or *Tetraplasandra* spp. (HINHP Database 2001; Service 1998b; 56 FR 55770; R. Hobdy and J. Lau, pers. comm., 2001).

The major threats to *Hesperomannia arbuscula* on Maui are habitat degradation by feral pigs, competition from nonnative plant species, trampling by humans, and extinction from naturally occurring random events caused by the small number of occurrences (Service 1998b; 56 FR 55770).

Hibiscus brackenridgei (Mao hau hele)

Hibiscus brackenridgei, a short-lived perennial member of the mallow family (Malvaceae), is a sprawling to erect

shrub or small tree. This species differs from other members of the genus in having the following combination of characteristics: Yellow petals; a calyx consisting of triangular lobes with raised veins and a single midrib; bracts attached below the calyx, and thin stipules (leaf bracts) that fall off, leaving an elliptical scar. Two subspecies are currently recognized, *Hibiscus brackenridgei* ssp. *brackenridgei* and *H. brackenridgei* ssp. *mokuleianus* (Bates 1990).

Hibiscus brackenridgei is known to flower continuously from early February through late May, and intermittently at other times of year. Intermittent flowering may possibly be tied to day length. Little else is known about the life history of *H. brackenridgei.* Pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 59 FR 56333).

Historically, *Hibiscus brackenridgei* was known from the islands of Kauai, Oahu, Lanai, Maui, Molokai, Kahoolawe, and Hawaii. Currently, *H. brackenridgei* ssp. *mokuleianus* is known from Oahu and from undocumented observations on Kauai. *Hibiscus brackenridgei* ssp. *brackenridgei* is currently known from Lanai, Maui, and Hawaii. On Maui, *H. brackenridgei* ssp. *brackenridgei* is found in 5 occurrences, containing 40 individuals, on State (Lihau section of West Maui NAR and DHHL) and privately owned lands at Lihau, Kaonohua, Keokea, and near Puu O Kali (Bates 1990; GDSI 2001; HINHP Database 2001; Service 1999; 59 FR 56333).

Hibiscus brackenridgei ssp. *brackenridgei* occurs in lowland dry forest sometimes with *Erythrina sandwicensis* as the dominant tree at elevations between 43 and 771 m (141 and 2,530 ft) and containing one or more of the following associated native plant species: *Achyranthes* spp. (NCN); *Chamaesyce celastroides* var. *lorifolia; Chenopodium* spp. (aheahea); *Diospyros* spp.; *Dodonaea viscosa; Melanthera lavarum; Myoporum sandwicense; Nototrichium* spp.; annual *Panicum* spp.; *Psydrax odorata; Schiedea salicaria* (NCN); or *Sida fallax* (HINHP Database 2001; Service 1999; 59 FR 56333; R. Hobdy, pers. comm., 2001).

The primary threats to *Hibiscus brackenridgei* ssp. *brackenridgei* on Maui and Kahoolawe are habitat degradation and possible predation by pigs, goats, cattle, axis deer, and rats; competition with nonnative plant species; fire; and extinction caused by random environmental events or reduced reproductive vigor caused by small occurrence size and the limited number of individuals (Service 1999; 59 FR 56333).

Ischaemum byrone (Hilo ischaemum)

Ischaemum byrone, a short-lived member of the grass family (Poaceae), is a perennial species with creeping underground and erect stems. *Ischaemum byrone* can be distinguished from other Hawaiian grasses by its tough outer flower bracts; dissimilar basic flower units, which are awned (slender bristle) and two-flowered; and a two-or three-tiered-branching inflorescence (O'Connor 1999).

Little is known about the life history of *Ischaemum byrone.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1996a; 59 FR 10305).

Historically, *Ischaemum byrone* was reported from Kauai, Oahu, Molokai, East Maui, and the island of Hawaii. Currently, this species is found on Kauai, Molokai, Maui, and Hawaii. On Maui, there are 6 occurrences with less than 2,000 individuals found on State and privately owned lands at Keopuka Rock, Paupalu Point, Moku Huki, west of Kalahu Point, between Keakulikuli Point and Pukaulua Point, and Kauiki Head (GDSI 2001; HINHP Database 2001; Service 1996a; 59 FR 10305).

Ischaemum byrone grows in close proximity to the ocean, among rocks or on basalt cliffs in windward coastal dry shrubland at elevations between 0 and 190 m (0 and 623 ft) and containing one or more of the following associated native plant species: *Bidens* spp. *Fimbristylis cymosa* (mauu akiaki) or *Scaevola taccada* (HINHP Database 2001; Service 1996a; 59 FR 10305; R. Hobdy, pers. comm., 2001).

The most serious threat to *Ischaemum byrone* is the invasion of nonnative plant species, particularly *Digitaria ciliaris* (Henry's crabgrass), *Ardisia elliptica* (shoebutton ardisia), and *Casuarina equisetifolia* (ironwood). Additionally, fire may pose a threat in areas infested with nonnative grasses, provided enough fuel is present. Other potential threats include grazing and browsing by goats and axis deer. Disturbance incurred from these ungulates further promotes the introduction and establishment of nonnative weeds. Some occurrences are also threatened by residential development (HINHP Database 2001; Service 1996a; 59 FR 10305).

Isodendrion pyrifolium (Wahine noho kula)

Isodendrion pyrifolium, a short-lived perennial of the violet family (Violaceae), is a small, branched shrub with elliptic to lance-shaped leaf blades. The papery-textured blade has moderately hairy veins. Below the petiole are oval, hairy stipules. *Isodendrion pyrifolium* is distinguished from other species in the genus by its smaller, green-yellow flowers and hairy stipules and leaf veins (Wagner *et al.* 1999).

During periods of drought, this species will drop all but the newest leaves. After sufficient rains, the plants produce flowers with seeds ripening one to two months later. Little else is known about the life history of *Isodendrion pyrifolium.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1996a; 59 FR 10305).

Isodendrion pyrifolium is known historically from six of the Hawaiian Islands: Niihau, Molokai, Lanai, Oahu, Maui, and the island of Hawaii. Currently, it is only found on the island of Hawaii (GDSI 2001; HINHP Database 2001; Service 1996a; 59 FR 10305; Marie Bruegmann, Service, pers. comm., 2000).

On Maui, *Isodendrion pyrifolium* occured in dry shrubland at elevations between 54 and 557 m (177 and 1,827 ft) with one or more of the following associated native plant species: *Capparis sandwichiana; Dodonaea viscosa; Myoporum sandwicense;* or *Psydrax odorata* (Service 1996a; 59 FR 10305; R. Hobdy and J. Lau, pers. comm., 2001).

Nothing is known of the threats to *Isodendrion pyrifolium* on the island of Maui (Service 1996a; 59 FR 10305).

Lysimachia lydgatei (NCN)

Lysimachia lydgatei, a short-lived perennial member of the primrose family (Primulaceae), is a sprawling, branched shrub with stems from 1 to 1.3 m (3 to 4 ft) long. This species is distinguished from others in the genus by the dense hairs on both the upper and lower surfaces of mature leaves (Wagner *et al.* 1999).

Little is known about the life history of *Lysimachia lydgatei.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997; 57 FR 20772).

Lysimachia lydgatei was known historically from a gulch behind

Lahaina on West Maui and from Oahu. Currently, it is found only on Maui on State (Lihau section of West Maui NAR and the West Maui Forest Reserve) and privately owned lands at Helu, Lihau, east of Halepohaku, and Ulaula within the West Maui Mountains Watershed Partnership. The 4 Maui occurrences number approximately 240 individuals (GDSI 2001; HINHP Database 2001; Service 1997; Wagner *et al.* 1999; 57 FR 20772).

Lysimachia lydgatei typically grows on the sides of steep ridges in *Metrosideros polymorpha-Dicranopteris linearis*-dominated wet to mesic shrubland or *Metrosideros polymorpha-Cheirodendron* spp. montane forest at elevations between 829 and 1,432 m (2,720 and 4,698 ft) and containing one or more of the following associated native plant species: *Astelia* spp. (painiu); *Broussaisia arguta; Coprosma* spp.; *Dodonaea viscosa; Eurya sandwicensis* (anini); *Ilex anomala; Leptecophylla tameiameiae; Lycopodium* spp. (wawae iole); *Ochrosia* spp. (holei); *Vaccinium* spp.; or mat ferns such as *Dicranopteris* spp. (HINHP Database 2001; Service 1997; 57 FR 20772; R. Hobdy, pers. comm., 2001).

The greatest threats to *Lysimachia lydgatei* are extinction from a random environmental event caused by the small number of occurrences; competition with nonnative plant species such as *Rubus argutus;* and fire (Service 1997; 57 FR 20772).

Mariscus pennatiformis (NCN)

Mariscus pennatiformis, a short-lived member of the sedge family (Cyperaceae), is a perennial plant with a woody root system covered with brown scales. *Mariscus pennatiformis* is divided into two subspecies, ssp. *bryanii* and ssp. *pennatiformis,* which are distinguished by the length and width of the spikelets; color, length, and width of the glume; and by the shape and length of the fruit. This species differs from other members of the genus by its three-sided, slightly concave, smooth stems; the length and number of spikelets; the leaf width; and the length and diameter of stems (Koyama 1990).

Mariscus pennatiformis is known to flower from November to December after heavy rainfall. Little else is known about the life history of *M. pennatiformis.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 59 FR 56333).

Historically, *Mariscus pennatiformis* was known from Kauai, Oahu, East Maui (Keanae Valley, Hana, and Nahiku), the island of Hawaii, and from Laysan in the northwestern Hawaiian Islands. *Mariscus pennatiformis* ssp. *bryanii* is only known from Laysan Island. *Mariscus pennatiformis* ssp. *pennatiformis* is currently found only on East Maui. Two occurrences of approximately 30 individuals are found on State-owned land near the mouth of Hanawi Stream (GDSI 2001; HINHP Database 2001; Service 1999; 59 FR 56333; K. Wood, *in litt.* 1999).

On Maui, *Mariscus pennatiformis* ssp. *pennatiformis* is found on cliffs with brown soil and talus within reach of ocean spray in *Pandanus tectorius* (hala) coastal wet forests at elevations between 0 and 188 m (0 and 615 ft) and containing one or more of the following associated native plant species: *Cyperus laevigatus* (makaloa); *Eragrostis* spp. (NCN); *Ipomoea* spp. (morning glory); *Lysimachia mauritiana;* or *Sadleria pallida* (HINHP Database 2001; Service 1999; 59 FR 56333; J. Lau, pers. comm., 2001; K. Wood, *in litt.* 1999).

Threats to *Mariscus pennatiformis* ssp. *pennatiformis* on Maui include grazing and habitat destruction caused by ungulates; competition with nonnative plant species; and extinction from random naturally occurring events (Service 1999; 59 FR 56333).

Melicope knudsenii (Alani)

Melicope knudsenii, a long-lived perennial member of the rue family (Rutaceae), is a tree with smooth gray bark and yellowish brown to olive-brown hairs on the tips of the branches. The species is distinguished from *M. haupuensis* and other members of the genus by the distinct carpels (chambers) present in the fruit, a hairless endocarp (fruit wall), a larger number of flowers per cluster, and the distribution of hairs on the underside of the leaves (Stone *et al.* 1999).

Little is known about the life history of *Melicope knudsenii.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1995a; 59 FR 9304).

Historically and currently, *Melicope knudsenii* is known from the southeastern slope of Haleakala on Maui and from Kauai. Currently on Maui, there are four occurrences on State (DHHL) and privately owned lands from Puu Mahoe to east of Puu Ouli (GDSI 2001; HINHP Database 2001; Service 1995a; 59 FR 9304).

Melicope knudsenii grows in *Nestegis sandwicensis-Pleomele* sp. mixed open dry forests at elevations between 648 and 1,331 m (2,125 and 4,367 ft) and containing one or more of the following associated native plant species: *Alphitonia ponderosa; Dodonaea viscosa; Osteomeles anthyllidifolia; Santalum ellipticum;* or *Xylosma hawaiiense* (HINHP Database 2001; Service 1995a; 59 FR 9304; R. Hobdy, pers. comm., 2001).

Threats to *Melicope knudsenii* include habitat degradation by nonnative animals, such as goats, cattle, and pigs; reduced reproductive vigor; fire; natural aging and death; and invasive plant species, such as *Pennisetum clandestinum* (Service 1995a; 59 FR 9304).

Melicope mucronulata (Alani)

Melicope mucronulata, a long-lived perennial of the rue family (Rutaceae), is a small tree up to 4 m (13 ft) tall with oval to elliptic-oval leaves, 8 to 16 cm (3 to 6.5 in) long and 3.5 to 6.5 cm (1.5 to 2.5 in) wide. This species is distinguished from others in the genus by the growth habit, the number of flowers in each flower cluster, the size and shape of the fruit, and the degree of hairiness of the leaves and fruit walls (Stone *et al.* 1999).

Little is known about the life history of *Melicope mucronulata.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997; 57 FR 20772).

First discovered in 1920 in Kanaio, East Maui, *Melicope mucronulata* was not relocated until 1983 when it was reported from privately owned land with an unknown number of plants in Auwahi. This species was also found two years later on East Molokai (GDSI 2001; HINHP Database 2001; Service 1997; Stone *et al.* 1999; 57 FR 20772).

Melicope mucronulata typically grows on gentle south-facing slopes in lowland dry to mesic forest at elevations between 625 and 1,331 m (2,050 and 4,367 ft) and containing one or more of the following associated species: *Antidesma pulvinatum; Dodonaea viscosa; Melicope hawaiensis* (alani); *Nestegis sandwicensis; Pleomele auwahiensis; Pouteria sandwicensis;* and *Streblus pendulinus* (Service 1997; 57 FR 20772; J. Lau, pers. comm., 2001).

The major threat to the continued existence of the only known occurrence of *Melicope mucronulata* on Maui is the risk of extinction from a random environmental event. Habitat degradation by goats and pigs, predation by goats, and competition with nonnative plant species, particularly *Melinis minutiflora,* also pose immediate threats to this species (Service 1997; 57 FR 20772).

Neraudia sericea (NCN)

Neraudia sericea, a short-lived perennial member of the nettle family (Urticaceae), is a 3 to 5 m (10 to 16 ft) tall shrub with densely hairy branches. The lower leaf surface is densely covered with irregularly curved, silky gray to white hairs along the veins. The male flowers may be stalkless or have short stalks. *Neraudia sericea* differs from the other four species of this endemic Hawaiian genus by the density, length, color, and posture of the hairs on the lower leaf surface and by its mostly entire leaf margins (Wagner *et al.* 1999).

Little is known about the life history of *Neraudia sericea.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 59 FR 56333).

Neraudia sericea was known historically from Molokai, Lanai, Olowalu Valley on West Maui, the southern slopes of Haleakala on East Maui, and from Kahoolawe. Currently, this species is known from Molokai and Maui. On Maui, five occurrences are found on State (DHHL) and privately owned lands in Pohakea Gulch (West Maui) and in Manawainui and Kamole Gulches (East Maui) (GDSI 2001; HINHP Database 2001; Service 1999; 59 FR 56333; M. Kaiaokamalie, *in litt.* 2000).

Neraudia sericea generally occurs in dry to mesic *Metrosideros polymorpha-Dodonaea viscosa-Leptecophylla tameiameiae* shrubland or forest or *Acacia koa* forest at elevations between 198 and 1,658 m (650 and 5,439 ft) and containing one or more of the following associated native plant species: *Bobea* spp.; *Coprosma* spp.; *Cyrtandra oxybapha* (haiwale); *Cyrtandra* spp.; *Diospyros* spp.; *Hedyotis* spp.; *Sida fallax;* or *Urera glabra* (HINHP Database 2001; Service 1999; Wagner *et al.* 1999; 59 FR 56333; M. Bruegmann, *in litt.* 1995; R. Hobdy, pers. comm., 2001).

The primary threats to *Neraudia sericea* on Maui are habitat degradation by feral pigs and goats; competition with the nonnative plant species *Cymbopogon refractus* (barbwire grass), *Eragrostis* spp. (love grass), *Holcus lanatus, Melinus minutiflora,* and *Pennisetum clandestinum;* and a risk of extinction caused by random environmental events (Service 1999; 59 FR 56333).

Nototrichium humile (Kului)

Nototrichium humile, a member of the amaranth family (Amaranthaceae), is an upright to trailing shrub with branched stems to 1.5 m (5 ft) long. This species is distinguished from the only other species in the genus by its inflorescence, a slender spike 4 mm (0.2 in) in diameter or less, which is covered with short hairs (Wagner *et al.* 1999).

Nototrichium humile has been observed flowering after heavy rain, but flowering is generally heaviest in the spring and summer. Fruits mature a few weeks after flowering. In cultivation, this species is known to live for more than a decade. Little else is known about the life history of *N. humile.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1998b; 56 FR 55770).

Historically, *Nototrichium humile* was known from Oahu and Maui. It currently occurs only on Oahu. On Maui, *N. humile* was last seen in the wild by Robert Hobdy in 1979 in Pohakea Gulch (HINHP Database 2001; Service 1998b; 56 FR 55770).

On Maui, *Nototrichium humile* occurred on old cinder cones in dry shrubland at elevations between 338 and 734 m (1,110 and 2,407 ft) with one or more of the following associated native plant species: *Dodonaea viscosa; Erythrina sandwicensis; Heteropogon contortus;* and *N. sandwicense* (kului) (Service 1998b; 56 FR 55770; J. Lau, pers. comm., 2001).

Nothing is known of the threats to *Nototrichium humile* on the island of Maui (Service 1998b; 56 FR 55770).

Peucedanum sandwicense (Makou)

Peucedanum sandwicense, a member of the parsley family (Apiaceae), is a short-lived, parsley-scented, sprawling herb. Hollow stems arise from a short, vertical, perennial stem with several fleshy roots. This species is the only member of the genus in the Hawaiian Islands. It is distinguished from other Hawaiian members of the family by being a slightly succulent perennial herb and having broad basal leaflets, white flowers, and by its floral bracts, the size and shape of its fruit, and the oil glands in the fruit wall (Constance and Affolter 1999).

Little is known about the life history of *Peucedanum sandwicense.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1995a; 59 FR 9304).

Historically and currently, *Peucedanum sandwicense* is known from Molokai, Maui, and Kauai. Discoveries in 1990 extended the known distribution of this species to the island of Oahu. Currently on Maui, there are 3 occurrences on State and privately owned lands at Keopuka Islet, near Pauwalu Point, and east of Hanawi Stream, with a total of 32 individuals (GDSI 2001; HINHP Database 2001; Service 1995a; 59 FR 9304).

This species grows on sparsely vegetated steep to vertical cliff habitats with little soil in mesic or coastal communities at elevations between 0 and 1,132 m (0 and 3,714 ft) and containing one or more of the following associated native species: *Artemisia australis; Bidens* spp.; *Carex* spp.; *Chamaesyce* spp.; *Diospyros sandwicensis; Eragrostis* spp.; *Hedyotis littoralis; Lysimachia mauritiana; Metrosideros polymorpha; Peperomia* spp.; *Pandanus tectorius* (hala); *Scaevola taccada;* or *Schiedea globosa* (NCN) (Constance and Affolter 1999; HINHP Database 2001; Service 1995a; 59 FR 9304; R. Hobdy and J. Lau pers. comms., 2001).

Competition with introduced plants is the major threat to *Peucedanum sandwicense* on Keopuka Rock. Additionally, small occurrence sizes also make the species subject to extinction caused by random environmental events (Service 1995a; 59 FR 9304).

Phlegmariurus mannii (Wawae iole)

Phlegmariurus (=*Huperzia,* =*Lycopodium*) *mannii,* a short-lived perennial member of the clubmoss family (Lycopodiaceae), is a hanging epiphyte with clustered, delicate red stems and forked reproductive spikes. These traits distinguish it from others in the genus in Hawaii (Degener and Degener 1959; Holub 1991; St. John 1981; Wagner and Wagner 1992).

Little is known about the life history of *Phlegmariurus mannii.* Reproductive cycles, dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1997; 57 FR 20772).

Historically, *Phlegmariurus mannii* was known from Kauai, West Maui (Haelaau and Hanaula), and the island of Hawaii. Currently, this species is found on Maui and Hawaii. On Maui, this species is now known on State (Lihau section of West Maui NAR, Makawao Forest Reserve, DHHL, and Kipahulu Forest Reserve), Federal and privately owned lands in Honokohau, Lihau, Puu Okakae, Manawainui, Healani Stream, Puu Ahulili, and Kaapahu within the East Maui Watershed Partnership and the West Maui Mountains Watershed Partnership. There are 7 occurrences with a total of 22 individuals on Maui (GDSI 2001; HINHP Database 2001; Service 1997; 57 FR 20772).

On Maui, *Phlegmariurus mannii* typically grows as an epiphyte on

Metrosideros polymorpha, Dodonaea viscosa and *Acacia koa* trees in moist, protected gulches or mossy tussocks in mesic to wet montane *Metrosideros polymorpha-Acacia koa* forests at elevations between 446 and 1,688 m (1,464 and 5,539 ft) and containing one or more of the following associated native plant species: *Astelia menziesiana* (kaluaha); *Athyrium* spp.; *Cheirodendron trigynum; Christella* spp. (NCN); *Coprosma* spp.; *Cyanea* spp.; *Cyrtandra* spp.; *Ilex anomala; Leptecophylla tameiameiae; Machaerina* spp.; *Sadleria* spp.; or *Vaccinium* spp. (Service 1997; 57 FR 20772; R. Hobdy, pers. comm., 2001).

The primary threats to this species are habitat alteration by goats, cattle and pigs, and the impacts of nonnative plant species. Additionally, small occurrence sizes also make the species subject to extinction caused by random environmental events (Service 1997; 57 FR 20772).

Phyllostegia mannii (NCN)

Phyllostegia mannii, a non-aromatic member of the mint family (Lamiaceae), is a climbing vine with many-branched, four-sided, hairy stems. This species is distinguished from others in the genus by its hairiness; its thin, narrow leaves, which are not pinnately divided; and the usually six flowers per false whorl in a terminal inflorescence (Wagner *et al.* 1999).

This species has been observed with fruit in July. Little else is known about the life history of *Phyllostegia mannii.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1996b; 57 FR 46325).

Historically, *Phyllostegia mannii* was found from Hanalilolilo to Ohialele on East Molokai and at Ukulele on East Maui. It has not been seen on Maui for over 70 years. This species is now known only from Molokai (HINHP Database 2001; Service 1996b; 57 FR 46325).

On Maui, *Phyllostegia mannii* occured on gentle slopes and the steep sides of gulches in mesic to wet forest dominated by *Acacia koa* and/or *Metrosideros polymorpha* at elevations between 1,069 and 1,615 m (3,506 and 5,297 ft) with one or more of the following associated native plant species: *Alyxia oliviformis; Cheirodendron trigynum; Dicranopteris linearis; Diplazium sandwichianum; Melicope* spp.; or *Myrsine lessertiana* (Service 1996b; 57 FR 46325; J. Lau, pers. comm., 2001).

Nothing is known of the threats to *Phyllostegia mannii* on the island of Maui (Service 1996b; 57 FR 46325).

Phyllostegia mollis (NCN)

Phyllostegia mollis, a short-lived member of the mint family (Lamiaceae), grows as a nearly erect, densely hairy, nonaromatic, perennial herb. Characteristics concerning the kind and amount of hair, the number of flowers in a cluster, and details of other plant parts separate this species from other members of the genus (Wagner *et al.* 1990).

Individual *Phyllostegia mollis* plants live for approximately 5 years. The species is known to flower in late winter and spring. Little else is known about the life history of *P. mollis.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1998b; 56 FR 55770).

Historically, *Phyllostegia mollis* was known from Oahu, Molokai, and East Maui. Currently, this species is only known from Oahu and Maui. On East Maui, a single occurrence with an unknown number of individuals remains on State (on the border of Kahikinui Forest Reserve and DHHL) land in Waiopai Gulch (GDSI 2001; HINHP Database 2001; Service 1998b; Wagner *et al.* 1999; 56 FR 55770).

Phyllostegia mollis typically grows on steep slopes and in gulches in mesic forests dominated by *Metrosideros polymorpha* and/or *Acacia koa* at elevations between 1,144 and 1,970 m (3,754 and 6,463 ft). Associated native plant species include *Alyxia oliviformis, Cheirodendron trigynum, Diplazium sandwichianum, Melicope* spp., and *Myrsine lessertiana* (Service 1998b; 56 FR 55770; J. Lau, pers. comm., 2001).

The major threats to *Phyllostegia mollis* are competition from the nonnative plant species *Rubus* spp. and *Schinus terebinthifolius,* and a risk of extinction of the only known occurrence of this species on Maui caused by random environmental events (Service 1998b; 56 FR 55770).

Phyllostegia parviflora (NCN)

Phyllostegia parviflora, a member of the mint family (Lamiaceae), is a perennial herb. The species is distinguished from others of the genus by the egg-shaped to broadly egg-shaped leaves, leaf stalks usually 6 to 13.5 cm (2.4 to 5.3 in) long, and the lower corolla lip 6 to 9 mm (0.24 to 0.36 in) long. *Phyllostegia parviflora* var. *glabriuscula* has fewer glandular hairs in the inflorescence, less pubescent leaves, and usually unbranched inflorescences compared with *P. parviflora* var. *parviflora. Phyllostegia parviflora* var. *lydgatei* has shorter leaf stalks, spreading hairs on the leaf stalks, and fewer gland-tipped hairs in the inflorescence. At the time of listing of this species, only two varieties were recognized, *glabriuscula* and *parviflora.* Subsequent to the final rule listing this species in 1996, Wagner's (1999) taxonomic treatment of this group reorganized *P. parviflora* var. *lydgatei* as distinct from *P. parviflora* var. *parviflora.* Wagner's (1999) treatment is cited in the revised edition of the Manual of the Flowering Plants of Hawaii as the basis for recognizing *P. parviflora* var. *lydgatei* (Wagner *et al.* 1999). This name change will be addressed in a future **Federal Register** notice.

Historically *Phyllostegia parviflora* was known from three islands, Oahu, Hawaii, and Maui. This species is now known only from two occurrences on Oahu (HINHP Database 2001; GDSI 2001; Service 1999; 61 FR 53108).

Nothing is known of the preferred habitat of or native plant species associated with *Phyllostegia parviflora* on the island of Maui (Service 1999; 61 FR 53108; R. Hobdy, pers. comm., 2001) or of the threats to *Phyllostegia parviflora* on the island of Maui (Service 1999; 61 FR 53108).

Plantago princeps (Laukahi kuahiwi)

Plantago princeps, a short-lived member of the plantain family (Plantaginaceae), is a small shrub or robust perennial herb. This species differs from other native members of the genus in Hawaii by its large branched stems, flowers at nearly right angles to the axis of the flower cluster, and fruits that break open at a point two-thirds from the base. The four varieties, vars. *anomala, laxiflora, longibracteata,* and *princeps,* are distinguished by the branching and pubescence of the stems; the size, pubescence, and venation of the leaves; the density of the inflorescence; and the orientation of the flowers (Wagner *et al.* 1999).

Individuals of this species have been observed in fruit from April through September. Little else is known about the life history of *Plantago princeps.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 59 FR 56333).

Plantago princeps was historically found on Kauai, Oahu, Molokai, Maui, and Hawaii. It is no longer extant on the island of Hawaii. Only one of the four varieties is on Maui; *Plantago princeps* var. *laxiflora* is known from Molokai

and Maui. On Maui, there are 8 occurrences of *P. princeps* var. *laxiflora,* with a total of 118 individuals, on Federal (Haleakala National Park) and privately owned lands within the East Maui Watershed Partnership. This variety is found at Kahoolewa Ridge, Nakalaloa Stream, Iao Valley near the Needle, Hanakauhi, the west side of Kaupo Gap, and Palikea Stream (GDSI 2001; HINHP Database 2001; Service 1999; 59 FR 56333).

On Maui, *Plantago princeps* var. *laxiflora* is typically found on basalt cliffs that are windblown with little vegetation in *Metrosideros polymorpha* lowland wet forest; or *Acacia koa-M. polymorpha* montane wet forest; or *M. polymorpha* montane wet shrubland at elevations between 281 and 2,539 m (922 and 8,329 ft) and containing one or more of the following associated native plant species: *Bidens micrantha* ssp. *kalealaha; Chamaesyce celastroides; Cyanea* spp.; or *Dryopteris* spp. and various other ferns, such as *Dubautia menziesii, Dubautia plantaginea* ssp. *humilis, Eragrostis variabilis, Hedyotis formosa, Leptecophylla tameiameiae, Melicope ovalis, Perrottetia sandwicensis, Pipturus albidus,* or *Touchardia latifolia* (HINHP Database 2001; Service 1999; 59 FR 56333; R. Hobdy, pers. comm., 2001).

The primary threats to *Plantago princeps* var. laxiflora on Maui are herbivory and habitat degradation by feral pigs and goats and competition with various nonnative plant species (Service 1999; 59 FR 56333).

Platanthera holochila (NCN)

Platanthera holochila, a short-lived, perennial member of the orchid family (Orchidaceae), is an erect, deciduous herb. The stems arise from underground tubers, the pale green leaves are lance- to egg-shaped and the greenish-yellow flowers occur in open spikes. This is the only species of this genus that occurs on the Hawaiian Islands. It is distinguished from other Hawaiian orchids by its underground tubers that lack roots at the nodes or pseudo bulbs, and the shape and length of its dorsal sepal (Wagner *et al.* 1999).

Little is known about the life history of *Platanthera holochila.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 61 FR 53108).

Historically, *Platanthera holochila* was known from Maui, Oahu, Molokai, and Kauai. Currently, *P. holochila* is extant on Kauai, Molokai, and Maui. On Maui, 5 occurrences with 22 individuals are reported on State (West Maui Forest Reserve) and privately owned lands within the West Maui Mountains Watershed Partnership and the East Maui Watershed Partnership from Kapaloa Stream, Waihee River, the border of Lahaina and Wailuku Districts and Koolau Gap (GDSI 2001; HINHP Database 2001; Service 1999; 61 FR 53108).

Platanthera holochila is found in *Metrosideros polymorpha-Dicranopteris linearis* montane wet forest or *M. polymorpha* mixed montane bog or mesic scrubby *M. polymorpha* forest at elevations between 536 and 2,314 m (1,759 and 7,592 ft) and containing one or more of the following associated native plant species: *Broussaisia arguta; Cibotium* spp.; *Clermontia* spp.; *Coprosma ernodeoides* (kukae nene); *Deschampsia nubigena; Dubautia scabra* (naenae); *Gahnia gahniiformis* (NCN); *Leptecophylla tameiameiae; Lycopodiella cernua* (wawae iole); *Luzula hawaiiensis* (wood rush); *Oreobolus furcatus; Polypodium pellucidum* (ae); *Sadleria* spp.; *Scaevola chamissoniana* (naupaka kuahiwi); *Sisyrinchium acre* (mauu laili); *Vaccinium reticulatum;* or *Wikstroemia* spp. (Service 1999; 61 FR 53108; R. Hobdy, pers. comm., 2001).

The primary threats to *Platanthera holochila* on Maui are habitat degradation and destruction by feral pigs; landslides; competition with nonnative plant species; and a risk of extinction on Maui from naturally occurring events and reduced reproductive vigor caused by the small number of remaining occurrences and individuals. Predation by slugs may also be a potential threat to this species (Service 1999; 61 FR 53108).

Pteris lidgatei (NCN)

Pteris lidgatei, a short-lived member of the maidenhair fern family (Adiantaceae), is a coarse perennial herb, 0.5 to 1 m (1.6 to 3.3 ft) tall. *Pteris lidgatei* can be distinguished from other species of *Pteris* on the Hawaiian Islands by the thick, brittle texture of its fronds and the tendency of the sori along the leaf margins to be broken into short segments instead of being fused into continuous marginal sori (Wagner 1949; Wagner and Wagner 1992).

Little is known about the life history of *Pteris lidgatei.* Reproductive cycles, dispersal agents, specific environmental requirements, and limiting factors are unknown (Service 1998a; 59 FR 49025).

Historically, *Pteris lidgatei* was found on Oahu, Molokai, and at Waihee on West Maui. Currently, this species is known from Oahu and Maui. Two occurrences with approximately 20 individuals occur on Maui on State (Kahakuloa section of the West Maui NAR) and privately owned lands within the West Maui Mountains Watershed Partnership north of Eke Crater and at Kauala (GDSI 2001; HINHP Database 2001; Service 1998a; 59 FR 49025).

This species grows on steep stream banks in wet *Metrosideros polymorpha-Dicranopteris linearis* montane forest at elevations between 201 and 1,717 m (659 and 5,633 ft) and containing one or more of the following native plant species: *Christella cyatheoides; Cibotium chamissoi; Dicranopteris linearis; Elaphoglossum crassifolium* (hoe a Maui); *Sadleria squarrosa* (apuu); or *Sphenomeris chinensis* (palaa) (HINHP Database 2001; Service 1998a; 59 FR 49025; R. Hobdy, pers. comm., 2001).

The primary threats to *Pteris lidgatei* on Maui are the nonnative plants *Ageratina adenophora, Clidemia hirta,* and *Tibouchina herbacea;* habitat destruction by feral pigs; and a risk of extinction caused by random environmental events (Service 1998a; 59 FR 49025).

Sanicula purpurea (NCN)

Sanicula purpurea, a short-lived member of the parsley family (Apiaceae), is a stout perennial herb, 8 to 36 cm (3 to 14 in) tall, arising from a massive perennial stem. This species is distinguished from others in the genus by the number of flowers per cluster and by the color of the petals (Constance and Affolter 1999).

Little is known about the life history of *Sanicula purpurea.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 61 FR 53108).

Historically and currently, *Sanicula purpurea* is known from Oahu and West Maui. On Maui, 7 occurrences totaling 200 individuals are currently known on State (Kahakuloa and Honokawai sections of the West Maui NAR) and private lands within the West Maui Mountains Watershed Partnership north of Eke Crater and east of Kahakuloa Stream, south of Eke Crater, near Violet Lake, the ridge west of Puu Kukui, and Kahoolewa Ridge east of Puu Kukui (GSDI 2001; HINHP Database 2001; Service 1999; 61 FR 53108).

This species typically grows in open *Metrosideros polymorpha* mixed montane bogs at elevations between 1,195 and 1,764 m (3,921 and 5,787 ft) and containing one or more of the following associated plant species: *Argyroxiphium caliginis* (eke silversword); *Argyroxiphium grayanum* (green sword); *Gahnia beecheyi* (NCN);

Geranium hillebrandii (nohoanu); *Lagenifera maviensis*; *Leptecophylla tameiameiae*; *Lycopodium* spp.; *Machaerina* spp.; *Myrsine vaccinioides* (kolea); *Oreobolus furcatus*; *Plantago pachyphylla* (laukahi kuahiwi); or *Viola maviensis* (HINHP Database 2001; Service 1999; 61 FR 53108; R. Hobdy, pers. comm., 2001).

Habitat degradation by feral pigs, a risk of extinction caused by random environmental events and reduced reproductive vigor caused by the small number of existing occurrences, and slugs are the major threats to *Sanicula purpurea* (HINHP Database 2001; Service 1999; 61 FR 53108).

Schiedea hookeri (NCN)

Schiedea hookeri, a member of the pink family (Caryophyllaceae), is a sprawling or clumped perennial herb. This species is distinguished from others in this endemic Hawaiian genus by its open, hairy, and sometimes sticky inflorescence, and by the size of the capsules (Wagner *et al.* 1999).

Based on field and greenhouse observations, *Schiedea hookeri* is hermaphroditic, which means that each individual has both male and female reproductive organs. Mature fruits have been observed in June and August. *Schiedea hookeri* appears to be an outcrossing species. Under greenhouse conditions, flowers do not set fruit unless pollinated. In the field, the species is presumed to be pollinated by insects, although none have been observed. A related species, *S. lydgatei* on Molokai, is apparently pollinated by native, night-flying moths. A series of self-pollinations, intra-population crosses, and crosses among populations have demonstrated that *S. hookeri* experiences moderately strong inbreeding depression. These results indicate that reductions in population size could result in inbreeding depression among progeny, with negative consequences for the long-term persistence of this species. Individuals of *S. hookeri* appear to be long-lived, but there is no evidence of reproduction from seed under field conditions. Seedlings of *Schiedea* occurring in mesic or wet sites are apparently consumed by introduced slugs and snails, which have been observed feeding on *S. membranacea,* another mesic forest species that occurs on Kauai. In contrast to mesic forest species, *Schiedea* occurring in dry areas produce abundant seedlings following winter rains, presumably because the drier sites have fewer nonnative predators. *Schiedea hookeri* differs considerably through its range in potential for clonal growth. Plants from Kaluakauila Gulch are upright and show little potential for clonal spread. In contrast, clonal growth has been detected for individuals at Kaluaa Gulch, where the growth form is decumbent and plants apparently root at the nodes. Little else is known about the life history of *Schiedea hookeri*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are otherwise unknown (HINHP Database 2001; Service 1999; Weller and Sakai, unpublished data; 61 FR 53108).

Historically, *Schiedea hookeri* was known from the Waianae Mountains of Oahu and from a single fragmentary collection from Haleakala on Maui that may represent *S. menziesii* rather than *S. hookeri*. Currently, this species is known only from Oahu (Environmental Division of the Army (EDA) Database 2001; HINHP Database 2001; Service 1999; 61 FR 53108).

Nothing is known of the preferred habitat of, or native plant species associated with, *Schiedea hookeri* on the island of Maui (Service 1999; 61 FR 53108; R. Hobdy, pers. comm., 2001), and nothing is known of the threats to *Schiedea hookeri* on the island of Maui (Service 1999; 61 FR 53108).

Schiedea nuttallii (NCN)

Schiedea nuttallii, a member of the pink family (Caryophyllaceae), is a generally hairless, erect subshrub. This long-lived perennial species is distinguished from others in this endemic Hawaiian genus by its habit, length of the stem internodes, length of the inflorescence, number of flowers per inflorescence, and smaller leaves, flowers, and seeds (Wagner *et al.* 1999).

Little is known about the life history of *Schiedea nuttallii*. Based on field and greenhouse observations, it is hermaphroditic. Plants on Oahu have been under observation for 10 years, and they appear to be long-lived. *Schiedea nuttallii* appears to be an outcrossing species. Under greenhouse conditions, plants fail to set seed unless hand-pollinated, suggesting that this species requires insects for pollination. Fruits and flowers are abundant in the wet season but can be found throughout the year. Little else is known about the life history of *S. nuttallii*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are otherwise unknown (Service 1999; 61 FR 53108).

Historically, *Schiedea nuttallii* was known from Kauai and Oahu and was reported from Maui. Currently, it is found on Kauai, Oahu, and Molokai (GDSI 2001; HINHP Database 2001; Service 1999; 61 FR 53108).

Nothing is known of the preferred habitat of, or native plant species associated with, *Schiedea nuttallii* on the island of Maui (Service 1999; 61 FR 53108; R. Hobdy, pers. comm., 2001), and nothing is known of the threats to *Schiedea nuttallii* on the island of Maui (Service 1999; 61 FR 53108).

Sesbania tomentosa (Ohai)

Sesbania tomentosa, a short-lived perennial member of the pea family (Fabaceae), is typically a sprawling shrub, but may also be a small tree. Each compound leaf consists of 18 to 38 oblong to elliptic leaflets which are usually sparsely to densely covered with silky hairs. The flowers are salmon colored, tinged with yellow, orange-red, scarlet or, rarely, pure yellow. *Sesbania tomentosa* is the only endemic Hawaiian species in the genus, differing from the naturalized *S. sesban* by the color of the flowers, the longer petals and calyx, and the number of seeds per pod (Geesink *et al.* 1999).

The pollination biology of *Sesbania tomentosa* has been studied by David Hopper, University of Hawaii at Manoa. His findings suggest that although many insects visit *Sesbania* flowers, the majority of successful pollination is accomplished by native bees of the genus *Hylaeus,* and that populations at Kaena Point on Oahu are probably pollinator-limited. Flowering at Kaena Point is highest during the winter-spring rains, and gradually declines throughout the rest of the year. Other aspects of the life history of *S. tomentosa* are unknown (Service 1999; 59 FR 56333).

Historically, *Sesbania tomentosa* occurred on all eight of the main Hawaiian Islands and on the northwestern Hawaiian Islands of Nihoa and Necker. Currently, *S. tomentosa* occurs on Kauai, Oahu, Molokai, Kahoolawe, Maui, Hawaii, Nihoa, and Necker. On Maui, *S. tomentosa* is known from 7 occurrences with a total of 83 individuals. The occurrences are located on State-owned and/or State-leased land (Lihau section of West Maui NAR, Hana Forest Reserve, and Kanaio Training Area), under Federal jusisdiction (Kanaio National Guard Training Area) and on privately owned land within the East Maui Watershed Partnership and West Maui Mountains Watershed Partnership at Poelua Bay, Mokolea Point, between Kahakuloa Head and Puu Kahulianapa, Mahinanui, Olowalu, and Pimoe, south of Puu Puou. Off the south central coast of Kahoolawe, approximately 100 individuals of *S. tomentosa* are found on a small islet, Puu Koae, a State-

owned seabird sanctuary (GDSI 2001; HINHP Database 2001; Service 1999; 59 FR 56333; R. Hobdy *in litt.* 2000).

Sesbania tomentosa is found on windswept slopes, sea cliffs, and cinder cones in *Scaevola taccada* coastal dry shrublands at elevations between 0 and 608 m (0 and 1,993 ft) and containing one or more of the following associated native plant species: *Bidens* spp.; *Diospyros sandwicensis*; stunted *Dodonaea viscosa*; *Jacquemontia ovalifolia* ssp. *sandwicensis* (pauohiiaka); *Melanthera integrifolia*; or *Sida fallax* (HINHP Database 2001; Service 1999; 59 FR 56333; R. Hobdy, pers. comm., 2001).

The primary threats to *Sesbania tomentosa* on Maui are habitat degradation caused by competition with various nonnative plant species such as *Lantana camara, Waltheria indica* (uhaloa), and various grass species; grazing and trampling by feral cattle; lack of adequate pollination; seed predation by rats, mice and, potentially, nonnative insects; fire; and destruction by off-road vehicles and other human disturbances. Threats to *S. tomentosa* on Kahoolawe include habitat degradation caused by competition with various nonnative plant species, erosion, and trampling by cats and seabirds (Service 1999; 59 FR 56333; P. Higashino, pers. comm., 2000).

Solanum incompletum (Popolo ku mai)

Solanum incompletum, a short-lived perennial member of the nightshade family (Solanaceae), is a woody shrub. Its stems and lower leaf surfaces are covered with prominent reddish prickles or sometimes with yellow fuzzy hairs on young plant parts and lower leaf surfaces. This species differs from other native members of the genus by being generally prickly and having loosely clustered white flowers, curved anthers about 2 mm (0.08 in) long, and berries 1 to 2 cm (0.4 to 0.8 in) in diameter (Symon 1999).

Little is known about the life history of *Solanum incompletum*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 59 FR 56333).

Historically, *Solanum incompletum* was known from Lanai, scattered locations on Maui, and the island of Hawaii. According to David Symon (1999), the known distribution of *S. incompletum* also extended to the islands of Kauai and Molokai. Currently, *S. incompletum* is only known from the island of Hawaii (HINHP Database 2001; Service 1999; 59 FR 56333).

Nothing is known of the preferred habitat of, or native plant species associated with, *Solanum incompletum* on the island of Maui (Service 1999; 59 FR 56333; R. Hobdy, pers. comm., 2001), and nothing is known of the threats to *Solanum incompletum* on the island of Maui (Service 1999; 59 FR 56333).

Spermolepis hawaiiensis (NCN)

Spermolepis hawaiiensis, a member of the parsley family (Apiaceae), is a slender annual herb with few branches. Its leaves are dissected into narrow, lance-shaped divisions. *Spermolepis hawaiiensis* is the only member of the genus native to Hawaii. It is distinguished from other native members of the family by being a non-succulent annual with an umbrella-shaped inflorescence (Constance and Affolter 1999).

Little is known about the life history of *Spermolepis hawaiiensis*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 59 FR 56333).

Historically, *Spermolepis hawaiiensis* was known from the islands of Kauai, Oahu, Lanai, and Hawaii. Currently, it is extant on Kauai, Oahu, Molokai, Lanai, Maui, and Hawaii. On Maui, there are five known occurrences with hundreds to thousands of individuals on State (Lihau section of West Maui NAR and Kanaio NAR) and privately owned lands within the West Maui Mountains Watershed Partnership in Puu Hipa, south of Kanaha Stream, Olowalu, and Kanaio (GDSI 2001; HINHP Database 2001; Service 1999; 59 FR 56333; Charles Chimera, USGS-BRD, pers. comm., 2000).

Spermolepis hawaiiensis on Maui is known from shady spots in *Dodonaea viscosa* lowland dry shrubland at elevations between 221 and 742 m (725 and 2,434 ft) and containing one or more of the following associated native species: *Diospyros* spp.; *Eragrostis variabilis*; *Erythrina sandwicensis*; *Gouania hillebrandii*; *Heteropogon contortus*; *Melanthera lavarum*; *Myoporum sandwicense*; *Pleomele* spp.; *Santalum ellipticum*; *Sida fallax*; or *Wikstroemia* spp. (HINHP Database 2001; Service 1999; 59 FR 56333; C. Chimera, pers. comm., 2000; R. Hobdy, pers. comm., 2001).

The primary threats to *Spermolepis hawaiiensis* on Maui are habitat degradation by feral goats, pigs, cattle, and axis deer; competition with various nonnative plants, such as *Lantana camara* and *Melinis repens*; fire; erosion, landslides, and rock slides caused by natural weathering, which result in the death of individual plants as well as habitat destruction (Service 1999; 59 FR 56333).

Tetramolopium arenarium (NCN)

Tetramolopium arenarium is a short-lived perennial and an upright, branched shrub in the sunflower family (Asteraceae). Alternate leaves are lance-shaped, hairy, glandular, and gray-green. This species is separated from other species of the genus in the Hawaiian Islands by several characters: Upright habit; number of heads per flower cluster; presence and type of glands and hairs; size of male ray flowers; number and color of bisexual disk flowers; and fruit shape and pubescence. Three infra-specific taxa are recognized: *Tetramolopium arenarium* ssp. *arenarium* var. *arenarium* (from Maui and Hawaii); *T. arenarium* ssp. *arenarium* var. *confertum* (from Hawaii); and *T. arenarium* ssp. *laxum* (from Maui). These taxa are distinguished by a combination of characters. *Tetramolopium arenarium* ssp. *arenarium* var. *confertum* and *T. arenarium* ssp. *laxum* have not been seen the late 1800s (Lowrey 1999).

Little is known about the life history of *Tetramolopium arenarium*. Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1996a; 59 FR 10305).

Tetramolopium arenarium was historically known from the islands of Maui and Hawaii. The species was considered extinct until *T. arenarium* ssp. *arenarium* var. *arenarium* was recently rediscovered on the island of Hawaii. Both subspecies were last seen on Maui in the late 1800s (GDSI 2001; HINHP Database 2001; Service 1996a; 59 FR 10305).

Nothing is known about the preferred habitat of or native species associated with *Tetramolopium arenarium* on Maui (Service 1996a; 59 FR 10305; R. Hobdy, pers. comm., 2001), and nothing is known of the threats to *Tetramolopium arenarium* on the island of Maui (Service 1996a; 59 FR 10305).

Tetramolopium remyi (NCN)

Tetramolopium remyi, a short-lived perennial member of the sunflower family (Asteraceae), is a many branched, decumbent (reclining, with the end ascending) or occasionally erect shrub up to about 38 cm (15 in) tall. The stems, leaves, flower bracts, and fruit are covered with sticky hairs. *Tetramolopium remyi* has the largest flower heads in the genus. Two other

species of the genus are known historically from Lanai, but both have purplish rather than yellow disk florets and from 4 to 60 rather than one flower head per branch (Lowrey 1999).

Tetramolopium remyi flowers between April and January. Field observations suggest that the population size of the species can be profoundly affected by variability in annual precipitation. The adult plants may succumb to prolonged drought, but apparently there is a seedbank in the soil that can replenish the population during favorable conditions. Such seed banks are of great importance for arid-dwelling plants to allow populations to persist through adverse conditions. Success in greenhouse cultivation of these plants with much higher water availability implies that, although these plants are drought-tolerant, perhaps the dry conditions in which they currently exist are not optimum. Individual plants are probably not long-lived. Pollination is hypothesized to be by butterflies, bees, or flies. Seed dispersal agents, specific environmental requirements, and other limiting factors of this species are unknown (Service 1995b; 56 FR 47686).

Historically, the species was known from the Lahaina area of West Maui and Lanai. Currently, *Tetramolopium remyi* is known from two occurrences on Lanai. It was last seen on Maui in 1944 until relocated in 2001 by Joel Lau of HINHP on State-owned land with an unknown number of plants in the Kuia area (GDSI 2001; HINHP Database 2001; Service 1995b; 56 FR 47686).

On Maui, *Tetramolopium remyi* occurs in lowland dry shrubland on dry, exposed ridges or flats at elevations between 52 and 550 m (171 and 1,804 ft). Associated plant species include *Bidens mauiensis, Bidens menziesii, Dodonaea viscosa, Eragrostis atropioides* (lovegrass), *Heteropogon contortus, Lipochaeta heterophylla* (NCN), or *Waltheria indica* (Service 1995b; 56 FR 47686; R. Hobdy, pers. comm., 2001).

Nothing is known of the threats to *Tetramolopium remyi* on the island of Maui (Service 1995b; 56 FR 47686).

Vigna o-wahuensis (NCN)

Vigna o-wahuensis, a member of the pea family (Fabaceae), is a slender, twining, short-lived perennial herb with fuzzy stems. Each leaf is made up of three leaflets which vary in shape from round to linear. This species differs from others in the genus by its thin, yellowish petals; sparsely hairy calyx; and thin pods, which may or may not be slightly inflated (Geesink *et al.* 1999).

Little is known about the life history of *Vigna o-wahuensis.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1999; 59 FR 56333).

Historically, *Vigna o-wahuensis* was known from Niihau, Oahu, East Maui in Makawao, Waiakoa, and Haleakala, and at an unspecified site on West Maui. Currently, *V. o-wahuensis* is known from the islands of Molokai, Lanai, Kahoolawe, Maui, and Hawaii. On the State-owned island of Kahoolawe, there is one occurrence with an unknown number of individuals in the Makaalae/Lua Kealialalo area. On Maui, there is a single occurrence of at least one individual on State-owned land at Kamanamana (GDSI 2001; HINHP Database 2001; Service 1999; 59 FR 56333; C. Chimera, pers. comm., 2000).

On Kahoolawe and Maui, *Vigna o-wahuensis* occurs in dry to mesic grassland and shrubland at elevations between 0 and 50 m (0 and 164 ft) and containing one or more of the following associated plant species: *Chamaesyce* spp.; *Chenopodium* spp.; or *Sida fallax* (HINHP Database 2001; Service 1999; 59 FR 56333; R. Hobdy, pers. comm., 2001).

The primary threats to *Vigna o-wahuensis* on Kahoolawe are competition with various nonnative plant species, fire, a risk of extinction caused by random environmental events, and reduced reproductive vigor caused by the small number of existing occurrences and individuals. The primary threats to this species on Maui are competition with the nonnative plant species *Cenchrus ciliaris* (buffelgrass) and *Lantana camara,* and herbivory by axis deer and goats (Service 1999; 59 FR 56333).

Zanthoxylum hawaiiense (Ae)

Zanthoxylum hawaiiense, a long-lived perennial, is a medium-sized tree with pale to dark gray bark and lemon-scented leaves in the rue family (Rutaceae). *Zanthoxylum hawaiiense* is distinguished from other Hawaiian members of the genus by several characters: Three leaflets all of similar size, one joint on the lateral leaf stalk, and sickle-shaped fruits with a rounded tip (Stone *et al.* 1999).

Little is known about the life history of *Zanthoxylum hawaiiense.* Flowering cycles, pollination vectors, seed dispersal agents, longevity, specific environmental requirements, and limiting factors are unknown (Service 1996a; 59 FR 10305).

Historically, *Zanthoxylum hawaiiense* was known from the islands of Kauai, Molokai, Lanai, Hawaii, and the southern and southwestern slopes of Haleakala on Maui. Currently, *Z. hawaiiense* is extant on the islands of Kauai, Molokai, Maui, and Hawaii. This species is found on Maui in 9 occurrences with a total of 11 individuals on private and State (Makawao Forest Reserve and DHHL) lands at Kahakapao, and in the Hana District, north and south of the Jeep Trail and north of the Kula Pipeline (GDSI 2001; HINHP Database 2001; Service 1996a; 59 FR 10305).

Zanthoxylum hawaiiense on Maui is reported from open lowland dry or mesic *Nestegis sandwicensis-Pleomele auwahiensis* forests, *Acacia koa-Pleomele auwahiensis* forest, or montane dry forest at elevations between 869 and 1,540 m (2,852 and 5,051 ft) and containing one or more of the following associated native species: *Alectryon macrococcus; Alphitonia ponderosa; Charpentiera* spp.; *Diospyros sandwicensis; Dodonaea viscosa; Melicope* spp.; *Metrosideros polymorpha; Myrsine lanaiensis; Osteomeles anthyllidifolia; Pisonia* spp. (papala kepau); *Santalum ellipticum; Sophora chrysophylla; Streblus pendulinus;* or *Xylosma hawaiiense* (HINHP Database 2001; Service 1996a; 59 FR 10305; R. Hobdy, pers. comm., 2001).

The threats to *Zanthoxylum hawaiiense* on Maui include browsing, grazing, and trampling by feral goats and cattle; competition with the nonnative plant species, *Lantana camara, Melia azedarach* (chinaberry) and *Pennisetum clandestinum;* fire; human disturbance; risk of extinction from naturally occurring events; and reduced reproductive vigor caused by the small number of populations (Service 1996a; 59 FR 10305).

A summary of occurrences and land ownership for the 70 plant species reported from the islands of Maui and Kahoolawe is given in Table 2.

TABLE 2.—SUMMARY OF EXISTING OCCURRENCES AND LAND OWNERSHIP FOR 70 SPECIES REPORTED FROM MAUI AND KAHOOLAWE

Species	Number of current occurrences	Land ownership		
		Federal	State	Private
Acaena exigua	0			
Adenophorus periens	0			
Alectryon macrococcus	13		X	X
Argyroxiphium sandwicense ssp. *macrocephalum*	7	X*		X
Asplenium fragile var. *insulare*	2	X*		X
Bidens micrantha ssp. *kalealaha*	4	X*	X	
Bonamia menziesii	6		X	X
Brighamia rockii	0			
Cenchrus agrimonioides	1		X	
Centaurium sebaeoides	3		X	X
Clermontia lindseyana	2		X	X
Clermontia oblongifolia ssp. *mauiensis*	1			
Clermontia peleana	0			
Clermontia samuelii	7	X*	X	
Colubrina oppositifolia	1			X
Ctenitis squamigera	12		X	X
Cyanea copelandii ssp. *haleakalaensis*	5	X*	X	X
Cyanea glabra	1			X
Cyanea grimesiana ssp. *grimesiana*	2			X
Cyanea hamatiflora ssp. *hamatiflora*	9	X*	X	X
Cyanea lobata	5			X
Cyanea mceldowneyi	11		X	X
Cyrtandra munroi	5		X	X
Delissea undulata	0			
Diellia erecta	5		X	X
Diplazium molokaiense	4		X	X
Dubautia plantaginea ssp. *humilis*	2			X
Flueggea neowawraea	4		X	X
Geranium arboreum	12		X	X
Geranium multiflorum	13	X*	X	X
Gouania vitifolia	0			
Hedyotis coriacea	1		X	
Hedyotis mannii	1			X
Hesperomannia arborescens	4		X	X
Hesperomannia arbuscula	8			X
Hibiscus brackenridgei	5		X	X
Ischaemum byrone	6		X	X
Isodendrion pyrifolium	0			
Kanaloa kahoolawensis	1		X	
Lipochaeta kamolensis	1		X	
Lysimachia lydgatei	4		X	X
Mariscus pennatiformis	2		X	
Melicope adscendens	16		X	X
Melicope balloui	3	X*		X
Melicope knudsenii	4		X	X
Melicope mucronulata	1			X
Melicope ovalis	2	X*		
Neraudia sericea	5		X	X
Nototrichium humile	0			
Peucedanum sandwicense	3		X	X
Phlegmariurus mannii	7	X*	X	X
Phyllostegia mannii	0			
Phyllostegia mollis	1		X	
Phyllostegia parviflora	0			
Plantago princeps	8	X*		X
Platanthera holochila	5		X	X
Pteris lidgatei	2		X	X
Remya mauiensis	5		X	
Sanicula purpurea	7		X	X
Schiedea haleakalensis	2	X*		
Schiedea hookeri	0			
Schiedea nuttallii	0			
Sesbania tomentosa	6	X**	X	X
Solanum incompletum	0			
Spermolepis hawaiiensis	5		X	X
Tetramolopium arenarium	0			
Tetramolopium capillare	5		X	X
Tetramolopium remyi	1		X	
Vigna o-wahuensis	2		X	

TABLE 2.—SUMMARY OF EXISTING OCCURRENCES AND LAND OWNERSHIP FOR 70 SPECIES REPORTED FROM MAUI AND KAHOOLAWE—Continued

Species	Number of current occurrences	Land ownership		
		Federal	State	Private
Zanthoxylum hawaiiense	9		X	X

* Haleakala National Park Lands.
** Kanaio Army National Guard Lands.

Previous Federal Action

Federal action on these plants began as a result of section 12 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*), which directed the Secretary of the Smithsonian Institution to prepare a report on plants considered to be endangered, threatened, or extinct in the United States. This report, designated as House Document No. 94–51, was presented to Congress on January 9, 1975. In that document, *Alectryon macrococcus* (as *Alectryon macrococcum* var. *macrococcum* and *Alectryon mahoe*), *Bonamia menziesii*, *Brighamia rockii*, *Clermontia lindseyana*, *Colubrina oppositifolia*, *Cyanea glabra* (as *Cyanea scabra* var. *variabilis*), *Cyanea lobata* (as *Cyanea baldwinii*), *Cyanea mceldowneyi*, *Flueggea neowawraea* (as *Drypetes phyllanthoides*), *Geranium arboreum*, *Geranium multiflorum* (as *Geranium multiflorum* var. *multiflorum*, var. *ovatifolium*, and var. *superbum*), *Hedyotis mannii* (as *Hedyotis thyrsoidea var. thyrsoidea*), *Hesperomannia arborescens* (as *Hesperomannia arborescens* var. *bushian*a and var. *swezeyi*), *Hesperomannia arbuscula*, *Hibiscus brackenridgei* (as *Hibiscus brackenridgei* var. *brackenridgei*, var. *mokuleianus*, and var. ''from Hawaii''), *Ischaemum byrone*, *Melicope balloui* (as *Pelea balloui*), *Melicope knudsenii* (as *Pelea multiflora*), *Melicope ovalis* (as *Pelea ovalis*), *Neraudia sericea* (as *Neraudia kahoolawensis*), *Nototrichium humile*, *Peucedanum sandwicense* (as *Peucedanum kauaiense*), *Phyllostegia mollis, Plantago princeps* (as *Plantago princeps* var. *elata*, var. *laxiflora,* var. *princeps*), *Remya mauiensis*, *Sesbania tomentosa* (as *Sesbania hobdyi* and *Sesbania tomentosa* var. *tomentosa*), *Vigna o-wahuensis* (as *Vigna sandwicensis* var. *heterophylla* and var. *sandwicensis*), and *Zanthoxylum hawaiiense* (as *Zanthoxylum hawaiiense* var. *citriodora*), were considered to be endangered; *Cyrtandra munroi*, *Diellia erecta*, and *Zanthoxylum hawaiiense* (as *Zanthoxylum hawaiiense* var. *hawaiiense* and var. *velutinosum*) were considered to be threatened; and *Asplenium fragile* var. *insulare* (as *Asplenium fragile*), *Bidens micrantha* ssp. *kalealaha* (as *Bidens distans* and *Bidens micrantha* ssp. *kalealaha*), *Ctenitis squamigera*, *Diplazium molokaiense*, *Gouania vitifolia*, *Hedyotis coriacea*, *Isodendrion pyrifolium*, *Melicope knudsenii* (as *Pelea knudsenii* and *Pelea tomentosa*), *Melicope mucronulata* (as *Pelea mucronulata*), *Phlegmariurus mannii* (as *Lycopodium mannii*), *Plantago princeps* (as *Plantago princeps* var. *acaulis* var. *denticulata*, and var. *queleniana*), *Pteris lidgatei*, *Tetramolopium arenarium* (as *Tetramolopium arenarium* var. *arenarium*, var. *confertum*, and var. *dentatum*), *Tetramolopium capillare*, and *Tetramolopium remyi* were considered extinct. On July 1, 1975, we published a notice in the **Federal Register** (40 FR 27823) of our acceptance of the Smithsonian report as a petition within the context of section 4(c)(2) (now section 4(b)(3)) of the Act, and gave notice of our intention to review the status of the plant taxa named therein. As a result of that review, on June 16, 1976, we published a proposed rule in the **Federal Register** (41 FR 24523) to determine endangered status pursuant to section 4 of the Act for approximately 1,700 vascular plant taxa, including all of the above taxa except *Cyanea glabra* and *Cyrtandra munroi;* additionally, *Argyroxiphium sandwicense* ssp. *macrocephalum* (as *Argyroxiphium macrocephalum*) appeared in the 1976 proposed rule as endangered. The list of 1,700 plant taxa was assembled on the basis of comments and data received by the Smithsonian Institution and the Service in response to House Document No. 94–51 and the July 1, 1975, **Federal Register** publication (40 FR 27823).

General comments received in response to the 1976 proposal were summarized in an April 26, 1978, **Federal Register** publication (43 FR 17909). In 1978, amendments to the Act required that all proposals over two years old be withdrawn. A 1-year grace period was given to proposals already over two years old. On December 10, 1979, we published a notice in the **Federal Register** (44 FR 70796) withdrawing the portion of the June 16, 1976, proposal that had not been made final, along with four other proposals that had expired. We published updated Notices of Review for plants on December 15, 1980 (45 FR 82479), September 27, 1985 (50 FR 39525), February 21, 1990 (55 FR 6183), September 30, 1993 (58 FR 51144), and February 28, 1996 (61 FR 7596). We listed the 70 species as endangered or threatened between 1991 and 1999. A summary of the listing actions can be found in Table 3(a).

TABLE 3(a).—SUMMARY OF LISTING ACTIONS FOR 70 PLANT SPECIES FROM MAUI AND KAHOOLAWE

Species	Federal status	Proposed listing rule		Final listing rule	
		Date	Federal Register	Date	Federal Register
Acaena exigua	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Adenophorus periens	E	09/14/93	58 FR 48012	11/10/94	59 FR 56333
Alectryon macrococcus	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Argyroxiphium sandwicense ssp. *macrocephalum*	T	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Asplenium fragile var. *insulare*	E	06/24/93	58 FR 34231	09/09/94	59 FR 49025
Bidens micrantha ssp. *kalealaha*	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Bonamia menziesii	E	09/14/93	58 FR 48012	11/10/94	59 FR 56333

TABLE 3(a).—SUMMARY OF LISTING ACTIONS FOR 70 PLANT SPECIES FROM MAUI AND KAHOOLAWE—Continued

Species	Federal status	Proposed listing rule		Final listing rule	
		Date	Federal Register	Date	Federal Register
Brighamia rockii	E	09/20/91	56 FR 47718	10/08/92	57 FR 46325
Cenchrus agrimonioides	E	10/02/95	60 FR 51417	10/10/96	61 FR 53108
Centaurium sebaeoides	E	09/28/90	55 FR 39664	10/29/91	56 FR 55770
Clermontia lindseyana	E	12/17/92	57 FR 59951	03/04/94	59 FR 10305
Clermontia oblongifolia ssp. *mauiensis*	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Clermontia peleana	E	12/17/92	57 FR 59951	03/04/94	59 FR 10305
Clermontia samuelii	E	05/15/97	62 FR 26757	09/03/99	64 FR 48307
Colubrina oppositifolia	E	12/17/92	57 FR 59951	03/04/94	59 FR 10305
Ctenitis squamigera	E	06/24/93	58 FR 34231	09/09/94	59 FR 49025
Cyanea copelandii ssp. *haleakalaensis*	E	05/15/97	62 FR 26757	09/03/99	64 FR 48307
Cyanea glabra	E	05/15/97	62 FR 26757	09/03/99	64 FR 48307
Cyanea grimesiana ssp. *grimesiana*	E	10/02/95	60 FR 51417	10/10/96	61 FR 53108
Cyanea hamatiflora ssp. *hamatiflora*	E	05/15/97	62 FR 26757	09/03/99	64 FR 48307
Cyanea lobata	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Cyanea mceldowneyi	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Cyrtandra munroi	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Delissea undulata	E	06/27/94	59 FR 32946	10/10/96	61 FR 53124
Diellia erecta	E	09/14/93	58 FR 48012	11/10/94	59 FR 56333
Diplazium molokaiense	E	06/24/93	58 FR 34231	09/09/94	59 FR 49025
Dubautia plantaginea ssp. *humilis*	E	05/15/97	62 FR 26757	09/03/99	64 FR 48307
Flueggea neowawraea	E	09/14/93	58 FR 48012	11/10/94	59 FR 56333
Geranium arboreum	E	01/23/91	56 FR 2490	05/13/92	57 FR 20589
Geranium multiflorum	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Gouania vitifolia	E	12/14/92	57 FR 39066	06/27/94	59 FR 32932
Hedyotis coriacea	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Hedyotis mannii	E	09/20/91	56 FR 47718	10/08/92	57 FR 46325
Hesperomannia arborescens	E	10/14/92	57 FR 47028	03/28/94	59 FR 14482
Hesperomannia arbuscula	E	09/28/90	55 FR 39664	10/29/91	56 FR 55770
Hibiscus brackenridgei	E	09/14/93	58 FR 48012	11/10/94	59 FR 56333
Ischaemum byrone	E	12/17/92	57 FR 59951	03/04/94	59 FR 10305
Isodendrion pyrifolium	E	12/17/92	57 FR 59951	03/04/94	59 FR 10305
Kanaloa kahoolawensis	E	05/15/97	62 FR 26757	09/03/99	64 FR 48307
Lipochaeta kamolensis	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Lysimachia lydgatei	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Mariscus pennatiformis	E	09/14/93	58 FR 48012	11/10/94	59 FR 56333
Melicope adscendens	E	05/11/93	58 FR 18073	12/05/94	59 FR 62346
Melicope balloui	E	05/11/93	58 FR 18073	12/05/94	59 FR 62346
Melicope knudsenii	E	10/30/91	56 FR 5562	02/25/94	59 FR 09304
Melicope mucronulata	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Melicope ovalis	E	05/11/93	58 FR 18073	12/05/94	59 FR 62346
Neraudia sericea	E	09/14/93	58 FR 48012	11/10/94	59 FR 56333
Nototrichium humile	E	10/02/95	60 FR 51398	10/10/96	61 FR 53089
Peucedanum sandwicense	T	10/30/91	56 FR 5562	02/25/94	59 FR 09304
Phlegmariurus mannii	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Phyllostegia mannii	E	09/20/91	56 FR 47718	10/08/92	57 FR 46325
Phyllostegia mollis	E	09/28/90	55 FR 39664	10/29/91	56 FR 55770
Phyllostegia parviflora	E	10/02/95	60 FR 51417	10/10/96	61 FR 53108
Plantago princeps	E	09/14/93	58 FR 48012	11/10/94	59 FR 56333
Platanthera holochila	E	10/02/95	60 FR 51417	10/10/96	61 FR 53108
Pteris lidgatei	E	06/24/93	58 FR 34231	09/09/94	59 FR 49025
Remya mauiensis	E	10/02/89	54 FR 40447	01/14/91	56 FR 1450
Sanicula purpurea	E	10/02/95	60 FR 51417	10/10/96	61 FR 53108
Schiedea haleakalensis	E	05/24/91	56 FR 23842	05/15/92	57 FR 20772
Schiedea hookeri	E	10/02/95	60 FR 51417	10/10/96	61 FR 53108
Schiedea nuttallii	E	10/02/95	60 FR 51417	10/10/96	61 FR 53108
Sesbania tomentosa	E	09/14/93	58 FR 48012	11/10/94	59 FR 56333
Solanum incompletum	E	09/14/93	58 FR 48012	11/10/94	59 FR 56333
Spermolepis hawaiiensis	E	09/14/93	58 FR 48012	11/10/94	59 FR 56333
Tetramolopium arenarium	E	12/17/92	57 FR 59951	03/04/94	59 FR 10305
Tetramolopium capillare	E	03/25/93	58 FR 16164	09/30/94	59 FR 49860
Tetramolopium remyi	E	09/17/90	55 FR 38236	09/20/91	56 FR 47686
Vigna o-wahuensis	E	09/14/93	58 FR 48012	11/10/94	59 FR 56333
Zanthoxylum hawaiiense	E	12/17/92	57 FR 59951	03/04/94	59 FR 10305

Key:
E= Endangered.
T= Threatened.

At the time each plant was listed, we found that designation of critical habitat was prudent for six of these plants (*Clermontia samuelii, Cyanea copelandii* ssp. *haleakalaensis, Cyanea glabra, Cyanea hamatiflora* ssp. *hamatiflora, Dubautia plantaginea* ssp. *humilis,* and *Kanaloa kahoolawensis*) and not prudent for the other 64 plants because it would not benefit the plant or would increase the degree of threat to the species. The not prudent determinations for these species, along with others, were challenged in *Conservation Council for Hawaii* v. *Babbitt,* 2 F. Supp. 2d 1280 (D. Haw. 1998). On March 9, 1998, the United States District Court for the District of Hawaii directed us to review the prudency findings for 245 listed plant species in Hawaii, including 64 of the 70 listed species reported from Maui. Among other things, the court held that in most cases we did not sufficiently demonstrate that the species are threatened by human activity or that such threats would increase with the designation of critical habitat. The court also held that we failed to balance any risks of designating critical habitat against any benefits (*id.* at 1283–85).

Regarding our determination that designating critical habitat would have no additional benefits to the species above and beyond those already provided through the section 7 consultation requirement of the Act, the court ruled that we failed to consider the specific effect of the consultation requirement on each species (*id.* at 1286–88). In addition, the court stated that we did not consider benefits outside of the consultation requirements. In the court's view, these potential benefits include substantive and procedural protections. The court held that, substantively, designation establishes a ''uniform protection plan'' prior to consultation and indicates where compliance with section 7 of the Act is required. Procedurally, the court stated that the designation of critical habitat educates the public, State, and local governments and affords them an opportunity to participate in the designation (*id.* at 1288). The court also stated that private lands may not be excluded from critical habitat designation even though section 7 requirements apply only to Federal agencies. In addition to the potential benefit of informing the public, State, and local governments of the listing and of the areas that are essential to the species' conservation, the court found that there may be Federal activity on private property in the future, even though no such activity may be occurring there at the present (*id.* at 1285–88).

On August 10, 1998, the court ordered us to publish proposed critical habitat designations or nondesignations for at least 100 species by November 30, 2000, and to publish proposed designations or nondesignations for the remaining 145 species by April 30, 2002 (*Conservation Council for Hawaii* v. *Babbitt,* 24 F. Supp. 2d 1074 (D. Haw. 1998)).

At the time we listed *Clermontia samuelii, Cyanea copelandii* ssp. *haleakalaensis, Cyanea glabra, Cyanea hamatiflora* ssp. *hamatiflora, Dubautia plantaginea* ssp. *humilis,* and *Kanaloa kahoolawensis* (64 FR 48307), we found that designation of critical habitat was prudent and stated that we would develop critical habitat designations for these six taxa, along with four others, by the time we completed designations for the 245 Hawaiian plant species. This timetable was challenged in *Conservation Council for Hawaii* v. *Babbitt,* Civ. No. 99–00283 HG (D. Haw. Aug. 19, 1999, Feb. 16, 2000, and March 28, 2000). The court agreed that it was reasonable for us to integrate these 10 Maui Nui (Maui, Lanai, Molokai, and Kahoolawe) plant taxa into the schedule established for designating critical habitat for the other 245 Hawaiian plants, but ordered us to publish proposed critical habitat designations for the 10 Maui Nui species by November 30, 2000, and to publish final critical habitat designations by November 30, 2001.

On November 30, 1998, we published a notice in the **Federal Register** requesting public comments on our reevaluation of whether designation of critical habitat is prudent for the 245 Hawaiian plants at issue (63 FR 65805). The comment period closed on March 1, 1999, and was reopened from March 24, 1999, to May 24, 1999 (64 FR 14209). We received more than 100 responses from individuals, non-profit organizations, the State Division of Forestry and Wildlife (DOFAW), county governments, and Federal agencies (U.S. Department of Defense-Army, Navy, Air Force). Only a few responses offered information on the status of individual plant species or on current management actions for one or more of the 245 Hawaiian plants. While some of the respondents expressed support for the designation of critical habitat for 245 Hawaiian plants, more than 80 percent opposed the designation of critical habitat for these plants. In general, these respondents opposed designation because they believed it would cause economic hardship, discourage cooperative projects, polarize relationships with hunters, or potentially increase trespass or vandalism on private lands. In addition, commenters also cited a lack of information on the biological and ecological needs of these plants which, they suggested, may lead to designation based on guesswork. The respondents who supported the designation of critical habitat cited that designation would provide a uniform protection plan for the Hawaiian Islands; promote funding for management of these plants; educate the public and State government; and protect partnerships with landowners and build trust.

On December 29, 1999, we provided information to landowners on the islands of Maui and Kahoolawe, regarding our requirement to designate critical habitat for 70 plant species. This information included a copy of the November 30, 1998, **Federal Register** notice, a map showing the general locations of the species that may be on his/her property, and a handout containing general information on critical habitat. We held two open houses on the island of Maui, at the Lahaina Civic Center and the Wailuku Community Center on January 11 and 12, 2000, respectively, to meet with local landowners and other interested members of the public. A total of 30 people attended the two open houses. In addition, we met with Maui County DOFAW staff to discuss their management activities on Maui.

On December 18, 2000, we published the second of the court-ordered proposed critical habitat designations or nondesignations for 61 Maui and Kahoolawe plants (65 FR 79192). The proposed critical habitat designations for Kauai and Niihau plants were published on November 7, 2000 (65 FR 66808), for Molokai plants on December 29, 2000 (65 FR 83158), and for Lanai plants on December 27, 2000 (65 FR 82086). All of these proposed rules were sent to the **Federal Register** by or on November 30, 2000, as required by the court orders. In those proposals we proposed that critical habitat was prudent for 61 species (*Alectryon macrococcus, Argyroxiphium sandwicense* ssp. *macrocephalum, Adenophorus periens, Bidens micrantha* ssp. *kalealaha, Bonamia menziesii, Brighamia rockii, Cenchrus agrimonioides, Centaurium sebaeoides, Clermontia lindseyana, Clermontia oblongifolia* ssp. *mauiensis, Clermontia samuelii, Colubrina oppositifolia, Ctenitis squamigera, Cyanea copelandii* ssp. *haleakalaensis, Cyanea glabra, Cyanea grimesiana* ssp. *grimesiana, Cyanea hamatiflora* ssp. *hamatiflora, Cyanea lobata, Cyanea mceldowneyi, Cyrtandra munroi, Delissea undulata,*

Diellia erecta, Diplazium molokaiense, Dubautia plantaginea ssp. *humilis, Flueggea neowawraea, Geranium arboreum, Geranium multiflorum, Hedyotis coriacea, Hedyotis mannii, Hesperomannia arborescens, Hesperomannia arbuscula, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion pyrifolium, Kanaloa kahoolawensis, Lipochaeta kamolensis, Lysimachia lydgatei, Mariscus pennatiformis, Melicope adscendens, Melicope balloui, Melicope knudsenii, Melicope mucronulata, Melicope ovalis, Neraudia sericea, Peucedanum sandwicense, Phlegmariurus mannii, Phyllostegia mannii, Phyllostegia mollis, Plantago princeps, Platanthera holochila, Pteris lidgatei, Remya mauiensis, Sanicula purpurea, Schiedea haleakalensis, Schiedea nuttallii, Sesbania tomentosa, Spermolepis hawaiiensis, Tetramolopium capillare, Tetramolopium remyi, Vigna o-wahuensis,* and *Zanthoxylum hawaiiense*) that are reported from Maui and/or Kahoolawe, as well as Kauai, Niihau, Molokai, and Lanai. We proposed that critical habitat was not prudent for one species, *Acaena exigua,* a species reported from Maui as well as Kauai, because it had not been seen recently in the wild, and no genetic material of this species was known to exist. At the time we proposed critical habitat on Maui, critical habitat was not proposed for four species, *Argyroxiphium sandwicense* ssp. *macrocephalum, Melicope balloui, Melicope ovalis,* and *Schiedea haleakalensis,* because they were found only in areas on Maui that did not require special management considerations or protection because they were already protected and managed to the benefit of these species, pursuant to 16 U.S.C. 1532(5)(A)(i). (However, a recent Federal District Court disagreed with this interpretation of the definition of critical habitat. *Center for Biological Diversity* v. *Norton,* Civ. No. 01–409 TUC DCB (D. Ariz. Jan. 13, 2003). While the Service still believes our interpretation is reasonable, we have not excluded areas from this critical habitat designation based on 16 U.S.C. 1532(5)(a)(i).)

On December 18, 2000, we proposed designation of critical habitat on approximately 13,574 ha (33,614 ac) of land on the island of Maui and 207 ha (512 ac) on the island of Kahoolawe. The publication of the proposed rule opened a 60-day public comment period, which closed on February 16, 2001. On February 22, 2001, we published a notice (66 FR 11131) announcing the reopening of the comment period until April 2, 2001, on the proposal to designate critical habitat for 50 plants from Maui and Kahoolawe and a notice of a public hearing. On March 20, 2001, we held a public hearing at the Renaissance Wailea Beach Resort, Maui.

On October 3, 2001, we submitted a joint stipulation with Earthjustice (representing the plaintiffs in *Hawaii Conservation Council* v. *Babbitt*) to the U.S. District Court requesting extension of the court order for the final rules to designate critical habitat for plants from Kauai and Niihau (July 30, 2002), Maui and Kahoolawe (August 23, 2002), Lanai (September 16, 2002), and Molokai (October 16, 2002), citing the need to revise the proposals to incorporate or address new information and comments received during the comment periods. The joint stipulation was approved and ordered by the court on October 5, 2001.

On April 3, 2002, we published a revised proposed rule for 70 listed plant species from Maui and Kahoolawe (67 FR 15856). Critical habitat for 61 (*Alectryon macrococcus, Argyroxiphium sandwicense* ssp. *macrocephalum, Asplenium fragile* var. *insulare, Bidens micrantha* ssp. *kalealaha, Bonamia menziesii, Brighamia rockii, Cenchrus agrimonioides, Centaurium sebaeoides, Clermontia lindseyana, Clermontia oblongifolia* ssp. *mauiensis, Clermontia samuelii, Colubrina oppositifolia, Ctenitis squamigera, Cyanea copelandii* ssp. *haleakalaensis, Cyanea glabra, Cyanea grimesiana* ssp. *grimesiana, Cyanea hamatiflora* ssp. *hamatiflora, Cyanea lobata, Cyanea mceldowneyi, Cyrtandra munroi, Diellia erecta, Diplazium molokaiense, Dubautia plantaginea* ssp. *humilis, Flueggea neowawraea, Geranium arboreum, Geranium multiflorum, Gouania vitifolia, Hedyotis coriacea, Hedyotis mannii, Hesperomannia arborescens, Hesperomannia arbuscula, Hibiscus brackenridgei, Ischaemum byrone, Isodendrion pyrifolium, Kanaloa kahoolawensis, Lipochaeta kamolensis, Lysimachia lydgatei, Mariscus pennatiformis, Melicope adscendens, Melicope balloui, Melicope knudsenii, Melicope mucronulata, Melicope ovalis, Neraudia sericea, Nototrichium humile, Peucedanum sandwicense, Phlegmariurus mannii, Phyllostegia mannii, Phyllostegia mollis, Plantago princeps, Platanthera holochila, Pteris lidgatei, Remya mauiensis, Sanicula purpurea, Schiedea haleakalensis, Sesbania tomentosa, Spermolepis hawaiiensis, Tetramolopium capillare, Tetramolopium remyi, Vigna o-wahuensis,* and *Zanthoxylum hawaiiense*) of the 70 plant species from the islands of Maui and Kahoolawe was proposed on approximately 51,208 ha (126,531 ac) of land on Maui, and approximately 1,372 ha (4,500 ac) on Kahoolawe (67 FR 15856). We proposed that critical habitat was prudent for six species (*Clermontia peleana, Gouania vitifolia, Nototrichium humile, Phyllostegia parviflora, Schiedea hookeri,* and *Tetramolopium arenarium*) for which a prudency finding had not been made previously. Critical habitat was not proposed for *Adenophorus periens, Clermontia peleana, Delissea undulata, Phyllostegia parviflora, Schiedea hookeri, Schiedea nuttallii, Solanum incompletum,* and *Tetramolopium arenarium* on the islands of Maui and Kahoolawe because these plants no longer occur on Maui or Kahoolawe, and we were unable to identify habitat which was essential to their conservation on these islands. Critical habitat was not proposed for *Acaena exigua,* a species reported from Maui as well as Kauai because it has not been seen recently in the wild and was not known to be in storage or under propagation.

The publication of the revised proposed rule opened up a 60-day public comment period, which closed on June 3, 2002. On July 11, 2002, we submitted joint stipulations with Earthjustice to the U.S. District Court requesting extension of the court orders for the final rules to designate critical habitat for plants from Lanai (December 30, 2002), Kauai and Niihau (January 31, 2003), Molokai (February 28, 2003), Maui and Kahoolawe (April 18, 2003), Oahu (April 30, 2003), the Northwestern Hawaiian Islands (April 30, 2003), and the island of Hawaii (May 30, 2003), citing the need to conduct additional reviews of the proposals, address comments received during the public comment periods, and to conduct a series of public workshops on the proposals. The joint stipulations were approved and ordered by the court on July 12, 2002. On August 26, 2002, we published a notice (67 FR 54764) announcing a public hearing and reopening the comment period until September 30, 2002. On August 27, 2002, September 12, 2002, and September 26, 2002, we held public meetings at the Maui Arts and Cultural Center, Kahului, Maui. On October 2, 2002, we published a notice (67 FR 61845) announcing the availability of the draft economic analysis on the proposed critical habitat and reopening the public comment period until November 2, 2002.

We determined that designation of critical habitat for the multi-island species, *Acaena exigua,* was not prudent on February 27, 2003 (68 FR

9116) and explained why we believe critical habitat is prudent for the following 45 multi-island species in other published final critical habitat rules: *Adenophorus periens; Alectryon macrococcus; Bidens micrantha* ssp. *kalealaha; Bonamia menziesii; Brighamia rockii; Cenchrus agrimonioides; Centaurium sebaeoides; Clermontia oblongifolia* ssp. *mauiensis; Clermontia samuelii; Ctenitis squamigera; Cyanea copelandii* ssp. *haleakalaensis; Cyanea glabra; Cyanea grimesiana* ssp. *grimesiana; Cyanea hamatiflora* ssp. *hamatiflora; Cyanea lobata; Cyrtandra munroi; Delissea undulata; Diellia erecta; Diplazium molokaiense; Flueggea neowawraea; Hedyotis mannii; Hesperomannia arborescens; Hibiscus brackenridgei; Ischaemum byrone; Isodendrion pyrifolium; Kanaloa kahoolawensis; Mariscus pennatiformis; Melicope knudsenii; Melicope mucronulata; Neraudia sericea; Peucedanum sandwicense; Phlegmariurus mannii; Phyllostegia mannii; Phyllostegia mollis; Phyllostegia parvilfora; Plantago princeps; Platanthera holochila; Pteris lidgatei; Schiedea nuttallii; Sesbania tomentosa; Solanum incompletum; Spermolepis hawaiiensis; Tetramolopium remyi; Vigna o-wahuensis;* and *Zanthoxylum hawaiiense* (64 FR 48307, 68 FR 1220, 68 FR 9116, 68 FR 12982). A summary of the critical habitat actions can be found in Table 3(b).

TABLE 3((b).—SUMMARY OF PREVIOUS CRITICAL HABITAT ACTIONS FOR 70 PLANT SPECIES FROM MAUI AND KAHOOLAWE

Species	Proposed critical habitat		Final critical habitat prior to publication of this rule	
	Date(s)	Federal Register	Date(s)	Federal Register
Acaena exigua	12/18/2000	65 FR 79192	NA	NA
Adenophorus periens	11/07/2000	65 FR 66808	02/27/03	68 FR 9116
	12/27/2000	65 FR 82086	03/18/03	
	12/29/2000	65 FR 83158		68 FR 12982
	03/04/2002	67 FR 9806		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 36968		
	05/28/2002	67 FR 37108		
Alectryon macrococcus	11/07/2000	65 FR 66808	02/27/03	68 FR 9116
	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	12/29/2000	65 FR 83158		
	01/28/2002	67 FR 3940		
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 37108		
Argyroxiphium sandwicense ssp. *macrocephalum*	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Asplenium fragile var. *insulare*	04/03/2002	67 FR 15856	NA	NA
	05/28/2002	67 FR 36968		
Bidens micrantha ssp. *kalealaha*	12/18/2000	65 FR 79192	01/09/03	68 FR 1220
	04/03/2002	67 FR 15856		
Bonamia menziesii	11/07/2000	65 FR 66808	02/27/03	68 FR 9116
	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	12/27/2000	65 FR 82086		
	01/28/2002	67 FR 3940		
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 36968		
	05/28/2002	67 FR 37108		
Brighamia rockii	12/29/2000	65 FR 83158	03/18/03	68 FR 12982
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
Cenchrus agrimonioides	03/04/2002	67 FR 9806	NA	NA
	04/03/2002	67 FR 15856		
	05/28/2002	67 FR 36968		
	05/28/2002	67 FR 37108		
Centaurium sebaeoides	11/07/2000	65 FR 66808	02/27/03	68 FR 9116
	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	12/27/2000	65 FR 82086		
	12/29/2000	65 FR 83158		
	01/28/2002	67 FR 3940		
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 37108		
Clermontia lindseyana	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
	05/28/2002	67 FR 36968		

TABLE 3((b).—SUMMARY OF PREVIOUS CRITICAL HABITAT ACTIONS FOR 70 PLANT SPECIES FROM MAUI AND KAHOOLAWE—Continued

Species	Proposed critical habitat		Final critical habitat prior to publication of this rule	
	Date(s)	Federal Register	Date(s)	Federal Register
Clermontia oblongifolia ssp. *mauiensis*	12/18/2000	65 FR 79192	NA	NA
	12/27/2000	65 FR 82086		
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
Clermontia peleana	05/28/2002	67 FR 36968	NA	NA
Clermontia samuelii	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Colubrina oppositifolia	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
	05/28/2002	67 FR 36968		
	05/28/2002	67 FR 37108		
Ctenitis squamigera	12/18/2000	65 FR 79192	02/27/03	68 FR 9116
	12/27/2000	65 FR 82086	03/18/03	68 FR 12982
	12/29/2000	65 FR 83158		
	01/28/2002	67 FR 3940		
	03/04/2002	67 FR 9806		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 37108		
Cyanea copelandii ssp. *haleakalaensis*	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Cyanea glabra	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Cyanea grimesiana ssp. *grimesiana*	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	12/27/2000	65 FR 82086		
	12/29/2000	65 FR 83158		
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/5/2002	67 FR 16492		
	05/28/2002	67 FR 37108		
Cyanea hamatiflora ssp. *hamatiflora*	12/18/2002	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Cyanea lobata	12/18/2000	65 FR 79192	NA	NA
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
Cyanea mceldowneyi	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Cyrtandra munroi	12/18/2000	65 FR 79192	NA	NA
	12/27/2000	65 FR 82086		
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
Delissea undulata	11/07/2000	65 FR 66808	02/27/03	68 FR 9116
	01/28/2002	67 FR 3940		
	05/28/2002	67 FR 36968		
Diellia erecta	12/18/2000	65 FR 79192	02/27/03	68 FR 9116
	12/29/2000	65 FR 83158	03/18/03	68 FR 12982
	01/28/2002	67 FR 3940		
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 36968		
	05/28/2002	67 FR 37108		
Diplazium molokaiense	12/18/2000	65 FR 79192	02/27/03	68 FR 9116
	01/28/2002	67 FR 3940	03/18/03	68 FR 12982
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 37108		
Dubautia plantaginea ssp. *humilis*	12/18/2000	65 FR 79192	NA	NA
	04/04/2002	67 FR 15856		
Flueggea neowawraea	11/07/2000	65 FR 66808	02/27/03	68 FR 9116
	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	01/28/2002	67 FR 3940		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 36968		
	05/28/2002	67 FR 37108		

TABLE 3((b).—SUMMARY OF PREVIOUS CRITICAL HABITAT ACTIONS FOR 70 PLANT SPECIES FROM MAUI AND KAHOOLAWE—Continued

Species	Proposed critical habitat		Final critical habitat prior to publication of this rule	
	Date(s)	Federal Register	Date(s)	Federal Register
Geranium arboreum	12/18/2000	65 FR 79192	NA	NA
	04/04/2002	67 FR 15856		
Geranium multiflorum	12/18/2000	65 FR 79192	NA	NA
	04/04/2002	67 FR 15856		
Gouania vitifolia	04/03/2002	67 FR 15856	NA	NA
	05/28/2002	67 FR 36968		
	05/28/2002	67 FR 37108		
Hedyotis coriacea	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
	05/28/2002	67 FR 36968		
	05/28/2002	67 FR 37108		
Hedyotis mannii	12/18/2000	65 FR 79192	NA	NA
	12/27/2000	65 FR 82086		
	12/29/2000	65 FR 83158		
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
Hesperomannia arborescens	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	12/29/2000	65 FR 83158		
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 37108		
Hesperomannia arbuscula	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
	05/28/2002	67 FR 37108		
Hibiscus brackenridgei	12/18/2000	65 FR 79192	02/27/03	68 FR 9116
	12/27/2000	65 FR 82086	03/18/03	68 FR 12982
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 36968		
	05/28/2002	67 FR 37108		
Ischaemum byrone	12/18/2000	65 FR 79192	02/27/03	68 FR 9116
	12/29/2000	65 FR 83157	03/18/03	68 FR 12982
	01/28/2002	67 FR 3940		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 36968		
Isodendrion pyrifolium	01/28/2002	67 FR 3940	03/18/03	68 FR 12982
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 36968		
	05/28/2002	67 FR 37108		
Kanaloa kahoolawensis	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Lipochaeta kamolensis	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Lysimachia lydgatei	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Mariscus pennatiformis	12/18/2000	65 FR 79192	02/27/03	68 FR 9116
	01/28/2002	67 FR 3940		
	04/03/2002	67 FR 15856		
	05/14/2002	67 FR 34522		
	05/28/2002	67 FR 37108		
Melicope adscendens	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Melicope balloui	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Melicope knudsenii	11/07/2000	65 FR 66808	02/27/03	68 FR 9116
	12/18/2000	65 FR 79192		
	01/28/2002	67 FR 3940		
	04/03/2002	67 FR 15856		

TABLE 3((b).—SUMMARY OF PREVIOUS CRITICAL HABITAT ACTIONS FOR 70 PLANT SPECIES FROM MAUI AND KAHOOLAWE—Continued

Species	Proposed critical habitat		Final critical habitat prior to publication of this rule	
	Date(s)	Federal Register	Date(s)	Federal Register
Melicope mucronulata	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	12/29/2000	65 FR 83158		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
Melicope ovalis	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Neraudia sericea	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	12/29/2000	65 FR 83158		
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
Nototrichium humile	04/03/2002	66 FR 79192	NA	NA
	05/28/2002	67 FR 37108		
Peucedanum sandwicense	11/07/2000	65 FR 66808	02/27/03	68 FR 9116
	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	12/29/2000	65 FR 83158		
	01/28/2002	67 FR 3940		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 37108		
Phlegmariurus mannii	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Phyllostegia mannii	04/03/2002	67 FR 15856	03/18/03	68 FR 12982
	04/05/2002	67 FR 16492		
Phyllostegia mollis	12/18/2000	65 FR 79192		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 37108		
Phyllostegia parviflora	05/28/2002	67 FR 37108	NA	NA
Plantago princeps	11/07/2000	65 FR 66808	02/27/03	68 FR 9116
	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	12/29/2000	65 FR 83158		
	01/28/2002	67 FR 3940		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 37108		
Platanthera holochila	11/07/2000	65 FR 66808	02/27/03	68 FR 9116
	12/18/2000	65 FR 79192		
	12/29/2000	65 FR 83158		
	01/28/2002	67 FR 3940		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 37108		
Pteris lidgatei	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 37108		
Remya mauiensis	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Sanicula purpurea	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
	05/28/2002	67 FR 37108		
Schiedea haleakalensis	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Schiedea hookeri	05/28/2002	67 FR 37108	NA	NA
Schiedea nuttallii	12/29/2000	65 FR 83158	03/18/03	68 FR 12982
	04/05/2002	67 FR 16492		
Sesbania tomentosa	11/07/2000	65 FR 66808	02/27/03	68 FR 9116
	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	12/29/2000	65 FR 83158		
	01/28/2002	67 FR 3940		
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/14/2002	67 FR 34522		
	05/28/2002	67 FR 36968		
	05/28/2002	67 FR 37108		

TABLE 3((b).—SUMMARY OF PREVIOUS CRITICAL HABITAT ACTIONS FOR 70 PLANT SPECIES FROM MAUI AND KAHOOLAWE—Continued

Species	Proposed critical habitat		Final critical habitat prior to publication of this rule	
	Date(s)	Federal Register	Date(s)	Federal Register
Solanum incompletum	01/28/2002	67 FR 3940	03/18/03	68 FR 12982
	04/05/2002	67 FR 16492		
Spermolepis hawaiiensis	11/07/2000	65 FR 66808	02/27/03	68 FR 9116
	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	12/27/2000	65 FR 82086		
	12/29/2000	65 FR 83158		
	01/28/2002	67 FR 3940		
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 36968		
	05/28/2002	67 FR 37108		
Tetramolopium arenarium	05/28/2002	67 FR 36968	NA	NA
Tetramolopium capillare	12/18/2000	65 FR 79192	NA	NA
	04/03/2002	67 FR 15856		
Tetramolopium remyi	12/27/2000	65 FR 79192	01/09/03	68 FR 1220
	04/04/2002	67 FR 15856		
	03/04/2002	67 FR 9806		
Vigna o-wahuensis	12/18/2000	65 FR 79192	02/27/03	68 FR 9116
	12/27/2000	65 FR 82086		
	12/29/2000	65 FR 83158		
	01/28/2002	67 FR 3940		
	03/04/2002	67 FR 9806		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 36968		
	05/28/2002	67 FR 37108		
Zanthoxylum hawaiiense	11/07/2000	65 FR 66808	02/27/03	68 FR 9116
	12/18/2000	65 FR 79192	03/18/03	68 FR 12982
	12/29/2000	65 FR 83158		
	01/28/2000	67 FR 3940		
	04/03/2002	67 FR 15856		
	04/05/2002	67 FR 16492		
	05/28/2002	67 FR 36968		

Summary of Comments and Recommendations

We received a total of seven oral and 2,779 written comments during the three comment periods on the revised proposal published on April 3, 2002, and the draft economic analysis, including the public hearing held on September 12, 2002, and the public meetings held on August 27, 2002 and September 26, 2002. These included responses from eight State offices, four local agencies, and 39 private organizations or individuals. Of the written comments, approximately 2,728 letters were submitted by facsimile or by e-mail, as part of mailing campaign, all in support of the proposed critical habitat designations. Of the other 51 comments, 21 supported the designation, 28 were opposed to it, and two provided information or declined to oppose or support the designations. We reviewed all comments received for substantive issues and new information regarding critical habitat for the Maui and Kahoolawe plants. Similar comments were grouped into ten general issues relating specifically to the proposed critical habitat designations and the draft economic analysis on the proposed designations. These are addressed in the following summary.

Peer Review

In accordance with our policy published on July 1, 1994 (59 FR 34270), we solicited independent opinions from 19 knowledgeable individuals with expertise in one or several fields, including familiarity with the species, familiarity with the geographic region that the species occurs in, and familiarity with the principles of conservation biology. We received comments from seven reviewers. One reviewer expressed support for the proposed critical habitat designations. The other six reviewers generally supported our methodology and conclusion, but none expressed support or opposition for the proposed critical habitat designations. Comments received from the peer reviewers are summarized in the following section and were considered in developing the final rule.

Issue 1: Species-Specific Biological Comments

(1) *Comment:* A peer reviewer noted that unit Maui I3 excludes two small DOFAW exclosures and an unprotected area containing good populations of *Geranium arboreum.* Critical habitat should be expanded to include these populations.

Our Response: While the habitat noted above may be important for the recovery of the species, not all suitable habitat (including occupied) is essential to the conservation of the species. At the time we proposed critical habitat on Maui, we were not aware of these exclosures, and we had identified and proposed other sites that (1) contain the primary constituent elements that are essential to the conservation of the species, (2) are within the species' historical range, and (3) accommodate

our recovery goals of 8 to 10 populations for *Geranium arboreum.*

(2) *Comment:* One commentor stated that the ''best scientific data available at this time'' does not support the areas being proposed for *Vigna o-wahuensis* on Kahoolawe. The proposed areas for this plant are based on a single observation at each of two different sites. Repeated surveys in these areas by plant specialists over the last 5 years have yet to confirm the presence of *Vigna* at these sites. However, the Navy commented that the area excluded from critical habitat perhaps merits reconsideration because *Vigna o-wahuensis* has appeared in the Lua Makika area on Kahoolawe that was previously the subject of a planned burn. That fact supports the conclusion that fire apparently does not adversely affect the constituent elements for *Vigna.*

Our Response: We have reevaluated the proposed designation of critical habitat for *Vigna o-wahuensis* on Kahoolawe in response to additional information received during the comment periods. Critical habitat was not designated for *Vigna o-wahuensis* on Kahoolawe because there is some question about the location of the earlier observations and because we were able to locate other sites that (1) contain the primary constituent elements that are essential to the conservation of the species, (2) are within the species' historical range, and (3) accommodate our recovery goals of 8 to 10 populations.

(3) *Comment:* One peer reviewer noted that reducing the amount of designated critical habitat for *Hibiscus brackenridgei* on West Maui and Lanai, because it occurs on more than one island, might adversely affect the retention of the genetic diversity needed for recovery. The diversity of East versus West Maui populations will not be retained if unit Maui D1 is reduced or removed. The Lanai prostrate form of the species is distinct from all other populations and should be conserved as a distinct recovery unit.

Our Response: We have retained our proposed designation of critical habitat for *Hibiscus brackenridgei* on Maui in this final rule. Because the Lanai populations are not considered by taxonomists to be a distinct subspecies, and therefore were not listed as such, we cannot consider them as separate from the Maui taxon. However, if the taxonomy is revised and the scientific community approves such revision, we will consider the new information with regard to critical habitat.

(4) *Comment:* One commenter was concerned that *Bidens micrantha, Lipochaeta kamolensis,* and *Sesbania tomentosa* might hybridize with other members of their families. It is possible that such unnatural hybridization could lead to further endangerment of the species while inducing the endangerment of other species.

Our Response: Hybridization presents potential problems with species recovery. To the maximum extent possible, we separated critical habitat of species that potentially had hybridization potential. In addition, issues of hybridization and other technical questions will be addressed in project specific recovery planning actions.

(5) *Comment:* In the case of *Phyllostegia mollis,* it appears that the Service is unsure for which species it is designating critical habitat. In the 1998 recovery plan for this species, the Service states, ''the Maui population may be separated into its own species.'' Critical habitat designation cannot be made for a plant or animal for which the science is so scant that more harm may come to the species by the designation.

Our Response: At the time the recovery plan was completed for *Phyllostegia mollis,* the Service acknowledged that the Maui population may warrant recognition as a separate species, based on a personal communication from Joel Lau, a botanist with the Hawaii Natural Heritage Program. In 1999, a taxonomic revision of the species was published by Dr. Warren L. Wagner in which the Oahu populations were recognized as *Phyllostegia mollis* and the Maui populations were assigned to *P. pilosa.* Due to the court-ordered deadlines, we are required to publish this final rule to designate critical habitat on Maui and Kahoolawe before we can prepare and publish a notice of taxonomic changes for this species. We plan to publish a taxonomic change notice for *Phyllostegia mollis* after we have published the final critical habitat designations on Maui and Kahoolawe. We do not believe that the designation of critical habitat for *Phyllostegia mollis* will entail harm to the species. Federal agencies are required to consult with the Service regarding any action they may fund, authorize, or permit that may affect a listed species or designated critical habitat. The consultation process results in conservation benefits to the species, not in harmful actions to the species.

(6) *Comment:* One commenter expressed concern about the designation of critical habitat for *Alectryon macrococcus* var. *auwahiensis* and *Melicope adscendens* on Ulupalakua Ranch. Forty *A. m.* var. *auwahiensis* trees were last sighted in 1910. No other populations of this tree were documented. However, the Service recommends that four new populations be established, even as far away as Kaupo. In the case of *M. adscendens,* the Service stated that within historic times, this species has apparently always been extremely rare. Restoring any plant or animal beyond their historical numbers and or geographical distribution is not the intent of the Act.

Our Response: Alectryon macrococcus var. *auwahiensis* trees were reported from the area as recently as 1990 and 1999. However, Ulupalakua Ranch has been excluded from critical habitat designation under section 4(b)(2), which states that critical habitat may be excluded if the benefits of not designating outweigh the benefits of designating critical habitat. We were also able to locate other sites for *A. m.* var. *auwahiensis* that (1) contain the primary constituent elements that are essential to the conservation of the species, (2) are within the species' historical range, and (3) accommodate our recovery goals of 8 to 10 populations.

(7) *Comment:* One peer reviewer and many commenters did not support the Service's conclusion that *Acaena exigua* would not benefit from critical habitat designation. These commenters pointed out that the fact that *Acaena* has not been sighted since 1999 (only three years ago) does not justify the Service's refusal to protect its critical habitat, as it is common for biologists in Hawaii to rediscover plants that have not been seen for decades. Some also felt that the decision was based on a faulty interpretation of the Act's direction to designate critical habitat ''to the maximum extent prudent.'' In enacting this language, according to these commenters, Congress clearly intended that the Service would designate critical habitat in all but the rare instances in which designation would actually increase threats to listed species from overcollecting or vandalism, or otherwise affirmatively harm the species. The Service cannot refuse to designate critical habitat merely because it cannot come up with examples of how critical habitat would benefit this species. Absent a finding that designation would actually harm *Acaena exigua* in some concrete way, the Service must designate its critical habitat. Furthermore, if the Service believes this species is extinct, it must follow the procedures set forth in the ESA for delisting species. As long as this species remains on the endangered species list, the Service cannot lawfully deny it the habitat protection that

Congress intended that all listed species enjoy.

Our Response: We continue to believe that it would not be prudent to designate critical habitat for *Acaena exigua.* It has not been seen in the wild since March 2000 (Hank Oppenheimer, Maui Pineapple Company Limited, pers. comm., 2001; Service 1997; 57 FR 20772) and is not known to be in storage or under propagation. Given these circumstances, we have determined that designation of critical habitat for *Acaena exigua* is not prudent because such designation would not be beneficial to the species. If this species is rediscovered, we may reconsider designating critical habitat for this species as new information becomes available. *See* 16 U.S.C. 1532(5)(B); 50 CFR 424.13(f).

Issue 2: Biological Justification and Methodology

(8) *Comment:* One peer reviewer was concerned about the number of populations needed for recovery. The expert opinion of the Hawaii Pacific Plant Recovery Coordinating Committee (HPPRCC) is that 10 to 20 viable populations are needed for recovery. How did the Service determine that 8 to 10 populations were all that should be required? While 8 to 10 populations may be sufficient for the recovery of long-lived species, it may be insufficient for ephemeral annuals or certain ferns or species with unique island variants. The target number of populations should be revisited on a species-by-species basis. Another peer reviewer commented that the proposed rule was improved by the use of targets of 8 to 10 populations ranging in size from 100 to 500 mature individuals, unless information that is more specific was available (*e.g.*, *Argyroxiphium sandwicense* ssp. *macrocephalum).* However, these targets are generally lower than those used by the HPPRCC and should be considered the ''low end'' of what is needed for recovery.

Our Response: In defining the procedures used to delineate essential habitat areas the HPPRCC agreed that ''the minimum target for each species was to have habitat for at least 10 potential populations for each species that was found on a single island and have habitat for at least 5 potential populations on each island for species that occurred on two or more islands. The maximum number of target populations was set at 20 potential populations.'' However, in defining generalized recovery objectives for Hawaiian plants, the committee recommended 5–10 populations for delisting. The Service adopted a relatively conservative 8–10 viable populations for the recovery objectives for each species in the recovery plans. Establishing and conserving 8 to10 viable populations on one or more islands within the historic range of the species will provide each species with a reasonable expectation of persistence and eventual recovery, even with the high potential that one or more of these populations will be eliminated by normal or random adverse events, such as the hurricanes that occurred in 1982 and 1992 on Kauai, fires, and nonnative plant invasions (HPPRCC 1994; Luijten *et. al.* 2000; Mangel and Tier 1994; Pimm *et. al.* 1998; Stacey and Taper 1992). We conclude that designation of adequate suitable habitat for 8 to 10 populations as critical habitat is essential to give the species a reasonable likelihood of long-term survival and recovery, based on currently available information.

(9) *Comment:* Areas that are excluded from proposed critical habitat should be identified and mapped in the proposed and final rule to allow reviewers to fully evaluate how well the proposal provides for listed species.

Our Response: Although we have not mapped the areas excluded from critical habitat, textual descriptions of the areas excluded can be found in the section titled ''Summary of Changes from the Revised Proposed Rule and *Analysis of Impacts Under Section 4(b)(2).*''

(10) *Comment:* One peer reviewer stated that the Service did not identify explicit modeling efforts that provide clear guidance for Hawaiian species. If available, these models should be evaluated and included in the Service's methodology to determine future critical habitat designations. Models of the population dynamics of understory plants in tropical forests, focusing on environmental variation caused by natural disturbance and plant-animal interactions, do exist.

Our Response: 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) to identify the optimal number, size, and location of critical habitat units to achieve recovery. 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, our approach employed two widely recognized and scientifically accepted goals for promoting viable populations of listed species: (1) Creation or maintenance of multiple populations so that a single or series of catastrophic events cannot destroy the entire listed species, and (2) increasing the size of each population in the respective critical habitat units to a level where the threats of genetic, demographic, and normal environmental uncertainties are diminished. In addition, we used a GIS model that evaluated known current and historic range, elevation, rainfall, and vegetation units to determine potential habitat for each species. Using this information plus information from existing historically known plant locations and advice from species experts, we modeled the potentially suitable habitat for each species. The critical habitat designated is a subset of suitable potential habitat that was determined to be essential to the conservation of each species (see the ''Methods'' section for more detail).

(11) *Comment:* One peer reviewer commented that fencing and control of ungulates is critical to the success of a plant restoration program. One commenter was concerned that there is a lack of solid scientific evidence on the relationship between introduced ungulates (in particular, cattle), nonnative plants, and native ecosystems. In the recovery plan for *Lipochaeta kamolensis,* the Service appears to concur that more research on the relationship between managed ungulates and native plants needs to be examined. In the Recovery Plan for the Maui Plant Cluster, the Service states, ''Portions of the populations should be left unfenced until the effects of protection from grazing and browsing are fully known.'' Because the science on how to best protect these plants is not certain, the designation of critical habitat may have a negative, rather than positive impact.

Our Response: We believe that it is important to control threats to the survival and recovery of federally listed species and have received numerous sources of information demonstrating that nonnative ungulates are a threat to the listed plant species as can be seen in the discussion of each species' background in the ''Discussion of Plant Taxa'' and ''*Analysis of Impacts Under Section 4(b)(2): Other Impacts*'' sections of this final rule. However, critical habitat is only one of many tools established in the Act that can play an important role in the recovery of the species. Critical habitat designation does not create a wilderness area, preserve, or wildlife refuge. It does not require activities associated with conservation management such as

ungulate control and fencing. Critical habitat increases protection of federally listed species by requiring consultation under section 7 of the Act to ensure that any action authorized, funded, or carried out by a Federal agency is not likely to result in the destruction or adverse modification of the critical habitat. The management of nonnative species is an important conservation issue that is addressed in the recovery plans for these species.

(12) *Comment:* One peer reviewer stated that degraded areas should only be excluded if they lack the ability to become habitat in the future. Another peer reviewer felt that, in some situations, populations in degraded habitat might be critical to the viability of the overall populations. Other peer reviewers commented that degraded habitat should be considered secondary only if adequate non-degraded habitat is available and designated. Many peer reviewers were optimistic about the potential for degraded areas to be restored. One peer reviewer suggested that sites significantly altered by human activities, such as roads and buildings, should not be included in conservation plans, but that areas that have been altered by agriculture and other activities that do not significantly disturb the soil should be included as they provide potential sites for restoration of plant species. Other commenters objected to critical habitat designation in degraded areas.

Our Response: We agree that recovery of a species is more likely in designated critical habitat in the least degraded areas containing primary constituent elements. During our evaluation of areas essential for the conservation of the species we tried to select the least degraded areas where possible because these areas are most essential. However, for some species, especially those only known from low-elevation areas, only degraded habitat remains. Therefore, some units still contain degraded habitat, but only if the area could be restored. Management for the restoration of these habitats is addressed in the species' recovery plans.

(13) *Comment:* The proposed designation failed to contain all historically known listed plants, and therefore failed to propose critical habitat for all listed plants statewide. The following endangered plant species lack proposed critical habitat on Maui and Kahoolawe: *Abutilon menziesii; Argyroxiphium sandwicense* ssp. *sandwicense; Abutilon menziesii; Caesalpinia kaviensis; Gardenia brighamii; Haplostachys haplostachya; Panicum fauriei* var. *carteri; Santalum freycinetianum* var. *lanaiense;* and *Scaevola coriacea.*

Our Response: These species were not part of the lawsuit (see ''Previous Federal Action'' section) and subsequent stipulations, and therefore were not included in this rulemaking. Critical habitat for these species may be considered in the future if warranted and funding and resources are available.

(14) *Comment:* Peer reviewers and other commenters wrote that the amount, location, and type of land proposed for critical habitat appears to be mostly adequate for the long-term conservation of these species. In order to build self-sustaining populations, adequate land for expansion is required, and most peer reviewers supported inclusion of larger amounts of land. One peer reviewer believes that removing significant portions of any of the proposed critical habitat units is likely to prevent the recovery of, or lead to the extinction of, listed species. One peer reviewer felt that the boundaries appear to be set by landowner parcels and not based upon the habitat features required for protection, especially units Maui H and L. Other commenters questioned the methodology that led to the increase in proposed critical habitat from 33,614 acres (13,574) in the original proposal to 126,531 acres (51,208 ha) in the revised proposal. These commenters believe the proposed critical habitat units are larger than necessary. The Service should work to ensure that (1) areas designated as critical habitat are ''essential for the conservation of the species'', and that (2) ''critical habitat does not include the entire geographical area which can be occupied by the threatened or endangered species'' 16 U.S.C. 1532(5)(C).

Our Response: We made revisions to the unit boundaries based on information supplied by commenters, as well as information gained from field visits to some of the sites, that indicated that the primary constituent elements were not present in certain portions of proposed units, that certain changes in land use had occurred on lands within the proposed critical habitat that would preclude those areas from supporting the primary constituent elements, or that the areas were not essential to the conservation of the species in question. In many cases, critical habitat boundaries were reduced for multi-island species because we have identified adequate and more appropriate habitat on other islands within the historical range in at least eight other places that have more primary constituent elements or are less degraded; already undergoing restoration; within a partnership, NAR, or TNCH preserve; or on a refuge.

No critical habitat units in the proposed rule were excluded or modified due to economic impacts. However, section 4(b)(2) of the Act requires us to consider other relevant impacts, in addition to economic impacts, of designating critical habitat. An area may be excluded from designation as critical habitat if the Secretary determines the benefits of excluding the area outweigh the benefits of designating the area as critical habitat (and provided the exclusion would not result in the extinction of the species). We have removed the two TNCH Maui Preserves, the State's Hanawi NAR, Maui Land and Pineapple Company, Inc.'s (ML&P) Puu Kukui Watershed Management Area (WMA), and Ulupalakua and Haleakala Ranches from final critical habitat designation based upon either their conservation history or the relevant issue that designation of critical habitat would have a negative effect on the landowner's voluntary ongoing conservation activities as well as future activities under consideration by the landowner. In both cases, we believe it is in the best interest of the species to exclude habitat from the designation based on their conservation actions. See ''*Analysis of Impacts Under Section 4(b)(2): Other Impacts*''.

The land area in the second proposal of critical habitat was increased from the first proposal caused by the Service's decision to include unoccupied habitat. To recover the species, it is essential in some instances to conserve suitable habitat that is not currently occupied to allow for the establishment of additional populations through natural recruitment or managed reintroductions. Establishment of additional populations will increase the likelihood that the species will survive and recover in the face of normal and stochastic events (*e.g.*, hurricanes, fire, and nonnative species introductions).

(15) *Comment:* The majority of our peer reviewers agreed that the methodology used to define critical habitat is appropriate, scientifically well grounded, and conceptually sound. The proposed rule represents the best scientific information available and the most scientifically appropriate techniques for determining critical habitat on Maui. On the other hand, some commenters felt that the Service's approach to designating critical habitat was not based on scientific principles and knowledge of the needs of the plant species. The proposed rule acknowledges that little is known about the life history, threats, or preferred

habitat of particular species and applies a ''broad-brush'' approach.

Our Response: In accordance with our policy on peer review published on July 1, 1994 (59 FR 34270), we solicited the expert opinions of appropriate and independent specialists regarding the proposed rule. The purpose of this peer review was to ensure that our methodology for designation of critical habitat of Maui plants was based on scientifically sound data, assumptions, and analysis. The majority of peer reviewers support our methodology. All data and information on species status information received in preparation of this rule were weighted equally and considered to come from reliable sources. Where discrepancies existed between different data sources, the most current data were used. While we agree that additional time would be beneficial for the preparation of these final rules, and the collection of more scientific information, we are required under the court-approved stipulation to finalize this designation by April 18, 2003. If provided with new information, we may revise the critical habitat designation in the future.

(16) *Comment:* Peer reviewers commented that a multi-population approach is essential for the survival and recovery of listed Hawaiian plant species. Multiple populations prevent small-scale changes in habitat from destroying all remaining individuals. The multiple population approach offers the opportunity to protect a wider range of genetic variability for each species, rather than concentrating on a single or small number of areas with genetically similar individuals. The Service has designated enough land to provide for the long-term conservation of multiple populations of the listed species.

Our Response: We agree that the multi-population approach to conservation is necessary for the recovery of Hawaii's endangered plants.

(17) *Comment:* One peer reviewer and other commenters stated that the proposed rule is improved by the inclusion of appropriate unoccupied habitat because such habitat will help to recover species that have been reduced to an unsustainable number of populations.

Our Response: We agree. Our recovery plans for these species identify the need to expand existing populations and reestablish wild populations within historic range.

(18) *Comment:* Several commenters opposed designating critical habitat in unoccupied areas. Two commenters wrote that lands in urban, agricultural, and rural districts are designated, used, and intended for a wide variety of land use activities. As such, there is a much greater likelihood that critical habitat designation will have an adverse economic impact on the landowner. These commenters recommend the following rebuttable presumption: non-conservation lands which are unoccupied by any listed species should not be designated as critical habitat

Our Response: Our recovery plans for these species identify the need to expand existing populations and reestablish wild populations within the historical range. Because of the very limited current range of many of these species, designating only occupied areas would not meet the conservation requirements of the species and would be inconsistent with our recovery plans. Occupied areas, as well as the similar habitat around them within the designated units of critical habitat that may be occupied in the future, provide the essential life-cycle needs of the species and provide some or all of the habitat components essential for the conservation (primary constituent elements) of these species. Expansion of some of these species to areas that were likely to have been historically occupied is essential to their recovery.

When designating unoccupied habitat for these species, we first evaluated lands that are suitable for each species. Of this suitable habitat, we determined which areas are essential for the conservation of each species using the guidelines outlined in the recovery plans (*i.e.*, areas that contain one or more of the primary constituent elements and are either in good condition for recovery efforts or could be made suitable through appropriate management actions), and would provide space needed by the species to reach our recovery goals 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.

Areas that contain one or more of the primary constituent elements, are either in good condition for recovery efforts or could be made suitable through appropriate management actions, and would provide space needed by the species to reach our recovery goals of 8 to 10 populations with a minimum number of mature reproducing individuals as specified above, were determined to be essential for the conservation of each species, regardless of land-use zoning.

(19) *Comment:* Proposed critical habitat includes unoccupied habitat. It appears that the Service has designated unoccupied habitat largely based on guesswork and the faulty conclusion that any areas that appear, based on limited biological knowledge to be potentially suitable habitat for these species (*i.e.*, ''merely capable of supporting'' these species), are by default essential habitat. This conclusion is not consistent with the provisions in the Act.

Our Response: As explained in the Methods section of this rule, we used the best scientific information available to determine areas that contain the physical and biological features that are essential for the conservation of the species covered by this designation. This information included the known locations, site-specific species information from the HINHP database and our own rare plant database; species information from the Center for Plant Conservation's (CPC's) rare plant monitoring database housed at the University of Hawaii's Lyon Arboretum; island-wide Geographic Information System (GIS) coverages (*e.g.*, vegetation, soils, annual rainfall, elevation contours, land ownership); the final listing rules for these 60 species; the December 18, 2000, proposal; the April 3, 2002, revised proposal; information received during the public comment periods and the public hearings; recent biological surveys and reports; our recovery plans for these species; and any species and management information received for the islands of Maui and Kahoolawe; discussions with botanical experts; and recommendations from the Hawaii and Pacific Plant Recovery Coordinating Committee (HPPRCC) (see also the discussion below) (GDSI 2000; HINHP Database 2000; HPPRCC 1998; Service 1995a, 1995b, 1996a, 1996b, 1997, 1998a, 1998b, 1999, 2001; 65 FR 66808; 67 FR 3940; CPC *in litt.* 1999).

In 1994, the HPPRCC initiated an effort to identify and map habitat it believed to be important for the recovery of 282 endangered and threatened Hawaiian plant species. The HPPRCC identified these areas on most of the islands in the Hawaiian chain, and in 1999, we published them in our *Recovery Plan for the Multi-Island Plants* (Service 1999). The HPPRCC expects that there will be subsequent efforts to further refine the locations of important habitat areas and that new survey information or research may also lead to additional refinement of identifying and mapping of habitat important for the recovery of these species.

The HPPRCC identified essential habitat areas for all listed, proposed,

and candidate plants and evaluated species of concern to determine if these essential habitat areas would provide for their habitat needs. However, the HPPRCC's mapping of habitat was distinct from the regulatory designation of critical habitat as defined by the Act. In addition, data have been collected since the recommendations made by the HPPRCC in 1998. Much of the area that was identified by the HPPRCC as inadequately surveyed has now been surveyed to some degree. New location data for many species have been gathered. Also, the HPPRCC identified areas as essential based on species clusters (areas that included listed species as well as candidate species, and species of concern) while we have only delineated areas that are essential for the conservation of the specific listed species at issue. As a result, the critical habitat designations in this rule include not only some habitat that was identified as essential in the 1998 recommendations but also habitat that was not identified as essential in those recommendations.

Issue 3: Site-Specific Biological Comments

(20) *Comment:* One peer reviewer was concerned about the lower elevation wet forests on windward Haleakala because Hanawi NAR is expected to be fenced only above 1,000 meters in elevation. *Cyanea mceldowneyi, Cyanea copelandii,* and *Clermontia samuelii* may rely on habitat lower than 1,000 meters in elevation.

Our Response: While the habitat lower than 1,000 m (3,281 ft) in elevation may be important for the conservation of these species, we do not believe that this habitat contains the primary constituent elements for *Cyanea mceldowneyi, Cyanea copelandii,* and *Clermontia samuelii.* Therefore, we did not find this area to be essential to the conservation of these three species.

(21) *Comment:* The boundaries of units Maui A and B should be relocated to follow existing conservation boundaries. The boundaries of units C1 and C2 should be refined to reflect that the appropriate habitat of the species of concern is sea cliffs within the spray zone. It should be clarified that units Maui C1 and C2 are unoccupied critical habitat for *Centaurium sebaeoides* and *Sesbania tomentosa.*

Our Response: The boundaries of units Maui A and B have been revised. We are no longer proposing critical habitat units Maui C1 and C2 for *Centaurium sebaeoides* and *Sesbania tomentosa* because we were able to locate other sites that were less degraded, contain a better representation of the primary constituent elements that are essential to the conservation of the species, are within the species' historical ranges, and accommodate our recovery goals of 8 to 10 populations.

(22) *Comment:* KIRC commented that, while we support the mission of the Service and the extraordinary efforts it is taking to protect endangered plants, the KIRC feels it is unnecessary to establish critical habitat for the listed taxa on Kahoolawe because of ongoing management for endangered species on the island by KIRC. In addition, because Kahoolawe is already a permanent natural and cultural reserve and a National Historic Site, it is already bound by a set of Federal and State rules for careful stewardship and does not require an additional layer of protection. Further, two of the proposed plants, *Hibiscus brackenridgei* and *Neraudia sericea,* have not been seen in over 90 years, although biological consultants continue to survey their historical locations.

Our Response: We did not designate critical habitat for *Hibiscus brackenridgei* and *Neraudia sericea* on Kahoolawe because we were able to locate other sites that contain the primary constituent elements that are essential to the conservation of the species, are within their historical ranges, and accommodate our recovery goals of 8 to 10 populations. The footprint of critical habitat on Kahoolawe is greatly reduced, although it remains designated for *Kanaloa kahoolawensis,* as Kahoolawe has the only suitable habitat for this species identified by our species experts. Designations of critical habitat are to be made on the basis of the best scientific and commercial data available, after taking into account the economic and other relevant impacts of specifying any area as critical habitat (16 U.S.C. 1533(b)(2)). An area may be excluded from designation as critical habitat if the Secretary determines the benefits of excluding the area outweigh the benefits of designating the area as critical habitat (and provided the exclusion would not result in the extinction of the species). However, because this is the last known occupied habitat for *Kanaloa kahoolawensis,* we do not believe that the benefits of excluding Kahoolawe outweigh the benefits of including it. *See ''Analysis of Impacts Under Section 4(b)(2): Other Impacts''.*

(23) *Comment:* One peer reviewer commented that the rationale for the configuration of unit Maui H is not clearly explained. In general, units should maximize interior areas and have easily identifiable boundaries. Why was an area almost encircled by unit Maui H excluded? This area appears to be part of the Kahikinui Forest Reserve with current populations of *Bidens micrantha* ssp. *kalealaha, Clermontia lindseyana, Diellia erecta, Diplazium molokaiense* and *Phyllostegia mollis.* If the Kahikinui area is not managed appropriately, adequate habitat for the above-mentioned species might not exist. Another peer reviewer questions the exclusion of the Waiopae-Wailaulau-Pahihi area from unit Maui H because it contains occurrences for two to three plant species and is DOFAW land slated and funded for fencing, restoration, and removal of cattle. It is crucial to include this parcel.

Our Response: We evaluated the Kahikinui area and determined that it was not essential for the conservation of the species because critical habitat was designated elsewhere for these species that is less degraded and contains a better representation of the primary constituent elements that are essential to the conservation of the species, are within their historical ranges, and accommodates our recovery goals of 8 to 10 populations.

Issue 4: Effects of Critical Habitat Designation

(24) *Comment:* One commenter suggested that critical habitat designation presents an opportunity to expand Hawaii's appeal in ecotourism. Many of the areas covered by the designation are degraded forests that could be restored to showcase Hawaii's unique birds and plants.

Our Response: Although we agree that the restoration of degraded forests is essential to the conservation of federally listed species, critical habitat is only one of many tools established in the Act that can play an important role in the recovery of the species. Critical habitat designation does not create a wilderness area, preserve, or wildlife refuge. It does not require activities associated with conservation management, such as ungulate control and fencing. Critical habitat increases protection of federally listed species by requiring consultation under section 7 of the Act to ensure that any action authorized, funded, or carried out by a Federal agency is not likely to result in the destruction or adverse modification of the critical habitat.

(25) *Comment:* Animal Rights Hawaii stated that although they support protection for endangered species, they are also concerned about protecting nonnative species. The current interpretation of critical habitat allows the Federal government and its partners

to utilize any methodology they wish in dealing with feral animals, even though such methods may be cruel and environmentally unsound.

Our Response: The designation of critical habitat does not give the Federal government and its partners the authority to utilize any methodology they wish in dealing with feral animals. Any potential animal control program would be subject to all applicable State, Federal, and local laws.

(26) *Comment:* Critical habitat designation, and the underlying decision to list as endangered the species that are the subject of the designation, exceed the constitutional limits of the Service's delegated authority. Congress enacted the ESA as an exercise of its Commerce Clause power and delegated exercise of that Commerce Clause power to the Service to apply the ESA by regulation. The listed species are not interstate. They exist only in Hawaii and do not cross state lines. Nor are they in commerce as the subject of any economic endeavor. They lack any commercial value. Therefore, the Service's regulations listing these species and designating critical habitat for them within Hawaii exceed the Federal power to regulate interstate commerce under the governing precedents interpreting the Commerce Clause.

Our Response: The Federal government has the authority under the Commerce Clause of the U.S. Constitution to protect species, for the reasons given in Judge Wald's opinion and Judge Henderson's concurring opinion in *National Association of Homebuilders* v. *Babbitt,* 130 F. 3d 1041 (D.C. Cir. 1997), *cert. denied,* 1185 S.Ct, 2340 (1998). *See also Gibbs* v. *Babbitt,* No. 99–1218 (4th Cir. 2000). The *Home Builders* case involved a challenge to application of ESA prohibitions to protect the listed Delhi Sands flower-loving fly (*Rhaphiomidas terminatus abdominalis*). As with the species at issue here, the Delhi Sands flower-loving fly is endemic to only one state. Judge Wald held that application of the ESA to this fly was a proper exercise of Commerce Clause power because it prevented loss of biodiversity and destructive interstate competition.

(27) *Comment:* Many commenters questioned the utility of critical habitat designation because it will not result in on-the-ground improvement of habitat or endangered species. Most commenters felt that voluntary partnerships to effect actual land management would be more beneficial to the species. Conversely, some commenters pointed out that critical habitat will prevent the Federal government from carrying out activities that destroy habitat or species in need of recovery and that it will benefit the people of Maui by preserving native forests, thus preventing erosion that pollutes water and smothers reefs.

Our Response: Critical habitat designation is one of a number of conservation tools established in the Act that can play an important role in the recovery of a species. For a Federal action to adversely modify critical habitat, the action would have to adversely affect the critical habitat's constituent elements or their management in a manner likely to appreciably diminish or preclude the role of that habitat in the conservation of the species. Designation of critical habitat is a way to guide Federal agencies in evaluating their actions, in consultation with the Service, such that their actions do not hamper conservation of listed species. There also are educational or informational benefits to the designation of critical habitat. Education benefits include the notification of land owners, land managers, and the general public of the importance of protecting the habitat of these species and dissemination of information regarding their essential habitat requirements.

(28) *Comment:* One commenter stated that the designation of critical habitat may result in delays and confusion in water use decisions in the State and that permits for non-point source discharges into protected areas may be denied, which would have a devastating effect on agricultural activities.

Our Response: As noted in the October 2002 Draft Economic Analysis (DEA), the likelihood of changes to the existing water diversions based on critical habitat is very low for the following two reasons: (1) None of the plants are stream-dependent for their survival and therefore would not cause a reduction in water diversion, and (2) water infrastructure is considered a manmade feature and therefore would not be included in critical habitat pursuant to the rule, because these features and structures normally do not contain, and are not likely to develop, any primary constituent elements. Thus, unless its operation and maintenance would indirectly affect critical habitat, which is not anticipated, it should not be affected by section 7 of the Act.

The potential impacts on State water uses were analyzed in the October 2002 DEA and December 2002 Addendum to the DEA. As noted in the DEA and Addendum, Maui County and Department of Water Supply (DWS) submitted specific information regarding planned projects in the proposed critical habitat during the public comment period. Possible and planned projects by the DWS include water source development in Unit B2; construction of a water reservoir adjacent to Unit L; access and intake improvements in Unit L; and repair and maintenance of existing flumes in Unit L. As noted in this final rule, we have removed Unit B2 from the final designation. Most of the identified DWS projects in Unit L involve repair and maintenance of existing manmade features and structures, and as such, would not be subject to section 7 consultation. However, to the extent that the planned improvements go beyond repair and maintenance and would be subject to section 7 consultation caused by Federal funding or permitting, the DEA's estimate of zero to two consultations reasonably reflects the potential number of section 7 consultations over the next 10 years (see Chapter VI, Section 3.k. of the DEA). As a worst case scenario, the DEA estimates that the consultations could cost up to $68,000 with project modifications that could range up to $200,000.

The State Department of Health Polluted Runoff Control Program and the State Office of Planning, Coastal Zone Management Program work together to address nonpoint source pollution through outreach and education and programs that utilize incentives. Under the Coastal Zone Act Reauthorization Amendments, Section 6217, the State is required to meet various conditions for approval of the State's Coastal Nonpoint Pollution Control Program by the U.S. Environmental Protection Agency. To meet these conditions, the State Department of Health is developing administrative rules to create Statewide enforceable policies and mechanisms to address nonpoint source pollution. These draft rules are currently the subject of public informational meetings. Public comments and suggestions received during these meetings will be considered before final rules are drafted and proposed to the Governor.

At the present time, there is no permit requirement for nonpoint source pollution. Moreover, the proposed rules regarding nonpoint source pollution make no reference to either water quality standards or to critical habitat. Until the State administrative rules are finalized, the impact caused by the interplay of nonpoint source pollution requirements and the designation of critical habitat is entirely speculative.

Issue 5: Mapping and PCEs

(29) *Comment:* The State of Hawaii Department of Transportation (DOT) stated that the proposed designations near State routes would restrict the design, maintenance, and construction of highways. In particular, Units Maui C1 and C2 may impact Route 30, Honoapiilani Highway, and Unit C3 may impact route 30, Kahekili Highway. Highway corridors require constant upkeep and periodic improvements to maintain safe transportation, keep abreast of changing policies and regulations, limit liability exposure, and manage congestion. These activities, and the intrusive nature of highway traffic itself (pollutants, litter, alien species), tend to conflict with the critical habitat designation. The DOT recommends that buffer zones on each side of the State highway right of way should be excluded from proposed critical habitat to minimize designation-related costs for future improvements, maintenance, and repair to roads, bridges, drainage culverts etc. The buffer zones should be based on topography and be a minimum of 100 feet (30 m) in width.

Our Response: Units C1 and C2 have been removed from the final designation and Unit C3 has been substantially reduced in the final designation. State DOT's comments did not identify any planned widening or other significant improvement project within Unit C3. Rather, State DOT's concerns focused on the impact to routine repair and maintenance. Operation and maintenance of existing manmade features and structures adjacent to critical habitat are not subject to section 7 consultation, unless they involve federal funding or permitting and they affect the critical habitat or the species.

(30) *Comment:* The Service should reconsider designating critical habitat on Navy lands because such designation will adversely impact the Navy's ability to accomplish its national defense mission. The designation will also impose costly procedural burdens on the Navy's ongoing efforts to clear ordnance at Kahoolawe. A careful analysis of the benefits and burdens of critical habitat designation may result in a determination that critical habitat designation on Kahoolawe is not prudent, especially in light of potential prescribed burns for clearing ordnance. While the Navy will manage endangered species found on its property, it will not agree to introduce any endangered species to an area where it is currently absent.

Our Response: In 1993, the U.S. Congress passed a law that required the return of Kahoolawe to the State of Hawaii and authorized Federal funding through November 2003. Therefore, critical habitat will not adversely impact the Navy's ability to accomplish its national defense mission as the Navy will not have a presence on the island for that purpose. As modified, the critical habitat designation on Kahoolawe covers the southeastern coastline, an area along the eastern side of the island, and an area on the western side of the island, predominantly overlapping with Level 3 and Level 4 areas—areas which have either received surface clearance only or which have received no ordnance clearance. Anticipated activities in these areas within the next 10 years are likely to be limited to ordnance removal. Part of the designation on the western tip of Kahoolawe is a Level 1 area, and anticipated activities in this area could include operation of overnight campsites with minimal facilities to support restoration efforts. The December 2002 Addendum to the Draft Economic Analysis of Proposed Critical Habitat for the Maui and Kahoolawe plants considered the effects of critical habitat designation on the Navy's clean-up program on Kahoolawe and estimates section 7 consultation costs to range from $0 to $47,100. The removal of ordnance, which will enable long-term restoration efforts to proceed, is consistent with the recovery goals for these listed plant species on Kahoolawe. Kahoolawe is essential to the conservation of *Kanaloa kahoolawensis* because this is the only place where this plant currently is known to exist.

Issue 6: Definition of Critical Habitat

(31) *Comment:* Many commenters, including peer reviewers, noted that critical habitat should be identified for all areas that may need to be managed for the benefit of the listed species. The ESA defines critical habitat (Section 3 (5)(A)(I)) as ''the specific areas * * * (I) essential to the conservation of the species and (II) which may require special management considerations or protection. It does not use the phrase ''which may require *additional* special management considerations or protection.'' Therefore, all areas that meet the definition of critical habitat should be designated, even if they are currently being managed for conservation. Designation of these areas would be in accordance with the mandatory duty to designate critical habitat ''to the maximum extent prudent and determinable'' 16 U.S.C. 1533(a)(3). Also, designation will provide an additional measure of protection by preventing Federal agencies from carrying out funding or approving any activity likely to result in adverse modification or destruction of critical habitat, whether directly or indirectly, regardless of the location of the activity. Furthermore, areas that may have adequate management in place may not be safe from even direct threats from Federal activities, which can arise with little warning. Additionally, adequate funding for conservation and management of listed species on lands currently being managed for conservation may not be assured. Multiple commenters wrote that the following areas should be designated as critical habitat: Haleakala National Park; Puu Kukui Watershed Management Area; Waikamoi; Kapunakea Preserves; and Hanawi Natural Area Reserve.

Our Response: While we do not necessarily agree with the commenters' interpretation of section 3(5)(A) we considered whether the areas proposed for exclusion because special management was not needed should be designated as critical habitat. However, section 4(b)(2) of the Act requires us to consider other relevant impacts, in addition to economic impacts, of designating critical habitat. An area may be excluded from designation as critical habitat if the Secretary determines the benefits of excluding the area outweigh the benefits of designating the area as critical habitat (and provided the exclusion would not result in the extinction of the species). We have removed the two TNCH Maui Preserves, the State's Hanawi NAR, ML&P's Puu Kukui WMA, and Ulupalakua and Haleakala Ranches from final critical habitat designation based upon either their conservation history or the relevant issue that designation of critical habitat would have a negative effect on the landowner's voluntary ongoing conservation activities as well as future activities under consideration by the landowner. In both cases, we believe it is in the best interest of the species to exclude habitat from the designation based on their conservation actions. *See* ''*Analysis of Impacts Under Section 4(b)(2): Other Impacts*''.

(32) *Comment:* Alexander and Baldwin, Inc., requested that the Service consider excluding lands managed by the East Maui Watershed Partnership (EMWP) because future EMWP efforts to protect the watershed are likely to include many of the same management measures identified as necessary for the recovery of endangered plant species within the watershed (*e.g.,* control of ungulates and invasive weeds). Cooperative conservation efforts by landowners ultimately will benefit

endangered species more than the mere designation of critical habitat.

Our Response: We agree that cooperative conservation efforts by landowners are important to the conservation of Hawaiian plant species. We did exclude portions of the EMWP, including portions of Hanawi NAR, Haleakala Ranch, and Waikamoi Preserve. However, at this time, we did not find the benefits of excluding other lands within the EMWP to outweigh the benefits of including them in critical habitat, under section 4(b)(2) of the Act. As resources allow, the Service would be willing to consider future revisions or amendments to this final critical habitat rule if landowners affected by this rule develop conservation programs or partnerships (*e.g.,* Habitat Conservation Plans, Safe Harbor Agreements, conservation agreements, etc.) on their lands that outweigh the regulatory and educational benefits of a critical habitat designation (*see* ''*Analysis of Impacts Under Section 4(b)(2): Other Impacts*'' for which the benefits of exclusion exceed the benefits of inclusion).

(33) *Comment:* One peer reviewer stated that it is not strategically wise to exclude most of the East Maui Watershed above 3,500–4,000 ft (1,067–1,219 m).

Our Response: We agree that the area is essential for the conservation of many of these species and have designated portions of this area as critical habitat.

(34) *Comment:* Maui Land and Pineapple Company, Inc. requested that the currently actively managed, conservation-zoned lands on West Maui (A, B1, and B2) be excluded from critical habitat designation. ML&P has cooperated with many other conservation agencies, including the Service, to preserve the native biodiversity of its conservation lands.

Our Response: We have excluded some of ML&P's lands under section 4(b)(2) of the Act, finding that the benefits of their conservation efforts outweigh the benefits of including those lands in this designation (*see* ''*Analysis of Impacts Under Section 4(b)(2): Other Impacts*''). However, there are other ML&P lands for which we did not make this finding, and they are therefore included in this critical habitat designation.

(35) *Comment:* The Service should comment on how Haleakala National Park will function as a result of designation of unit Maui J.

Our Response: Haleakala National Park will continue to function much the same as it had before the critical habitat designation. However, they will need to consult with us, under section 7 of the Act, if they are planning a project that may affect critical habitat.

(36) *Comment:* The Estate of James Campbell requested that the critical habitat boundaries for their Kula and Kaupo properties be amended in light of a lack of important data on species' life history and habitat. They specifically request that the proposed designation on the Kaupo property be adjusted to exclude unoccupied agricultural land that could be adversely affected by such a designation.

Our Response: Unoccupied agricultural lands of the Kaupo properties were not included in the proposed or final designations. However, we have found that some of the James Campbell Estate lands are essential to the conservation of some of the species and do not meet the criteria under section 3(5)(A) of the Act for exclusion because long-range management goals and plans are not yet in place. These lands have been included in the final critical habitat designation. As resources allow, however, the Service would be willing to consider future revisions or amendments to this final critical habitat rule if landowners affected by this rule develop conservation programs or partnerships (*e.g.,* Habitat Conservation Plans, Safe Harbor Agreements, conservation agreements, etc.) on their lands that outweigh the regulatory and educational benefits of a critical habitat designation (*see* ''*Analysis of Impacts Under Section 4(b)(2): Other Impacts*'').

(37) *Comment:* Ulupalakua Ranch requested that its lands be removed from proposed critical habitat for the following reasons: (1) Likelihood of private party lawsuits resulting in mandated protection for critical habitat; (2) likelihood of private party lawsuits limiting current ranch operations; (3) limits on development of diversified agricultural operations caused by the Ranch's interest in Federal cost share programs; (4) lost revenues; (5) expenditures to assess the impact of the proposed designations; (6) economic hardship resulting from increased expenses to counter trespassing caused by increased curiosity over critical habitat lands; (7) lower economic returns and job loss caused by critical habitat dividing up sections of the Ranch, thus leading to inefficiency; (8) concern over the Service becoming involved in County Permitting processes (as they did when Ulupalakua Ranch requested a Special Use Permit from the County of Maui for telecommunications purposes); (9) ranch lands consisting of predominantly nonnative alien species that the Service has documented as threats; and (10) a reduced willingness of the Ranch to participate in voluntary conservation efforts.

Our Response: We found that Ulupalakua Ranch met the requirements under 4(b)(2) of the Act (*see* ''*Analysis of Impacts Under Section 4(b)(2)*'') and therefore has been excluded from critical habitat designation.

Issue 7: Policy and Regulations

(38) *Comment:* One commenter opposed the designation of critical habitat in East Maui from Makawao to Kula because hunters use these areas.

Our Response: Critical habitat designation does not affect activities, including human access, on State or private lands unless some kind of Federal permit, license, or funding is involved and the activities may affect the species. It imposes no regulatory prohibitions on State or other non-Federal lands, nor does it impose any restrictions on State or non-Federal activities that are not funded or authorized by any Federal agencies. Access to Federal lands that are designated as critical habitat is not restricted unless access is determined to result in the destruction or adverse modification of the critical habitat. If we determine that access will result in adverse modification of the critical habitat, we will suggest reasonable or prudent alternatives that allow the proposed activities to proceed. Recreational, commercial, and subsistence activities, including hunting, on non-Federal lands are not regulated by this critical habitat designation, and may be impacted only where there is Federal involvement in the action and the action is likely to destroy or adversely modify critical habitat. According to our economic analysis the probability of a major change in game management by the State is regarded as slight. Thus, designation of critical habitat is expected to have minor economic impacts related to management of game mammals and to hunting.

Issue 8: Economic Issues

(39) *Comment:* An economic analysis (EA) must be completed before critical habitat is designated. Even though the Service is designating critical habitat before conducting an EA in order to meet a court imposed deadline, the Service is not relieved from meeting the prudent and determinable standard for designating critical habitat. It is a disservice to the landowners to not include an economic impact analysis at the time of proposed designation even if the Service anticipates that such designation will not have any significant economic impact. Any

proposed critical habitat designated without first conducting an economic analysis would be imprudent and premature.

Our Response: We did not designate critical habitat before conducting an EA. The draft economic analysis was published and made available for review on October 2, 2002 (67 FR 61845). The comment period on the proposed rule to designate critical habitat for these 61 species from the islands of Maui and Kahoolawe was extended until November 1, 2002, to allow interested and affected parties the opportunity to review the draft economic analysis in conjunction with the proposed critical habitat rule.

The Service determines whether critical habitat designation is prudent according to regulations found at 50 CFR 424.12(a). In accordance with these regulations, critical habitat designation is not prudent only when one or both of the following two situations exist: (1) The species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of such threat to the species; or (2) such designation would not be beneficial to the species. The economic analysis is conducted after critical habitat has been proposed in a given area, as set forth in regulations found at 50 CFR 424.19. If we find that economic and other impacts outweigh the benefit of designating critical habitat in a given area, that area may be excluded.

(40) *Comment:* The proposal identifies portions of two habitat units (units C1, C2, C3, G1, and G5), that consist in part of private lands and are occupied by only one or two species, which have known current populations on other islands. Portions of these units may have economic value to their respective landowners for eventual shoreline development or as sources of surface water for irrigation. Absent the economic analysis, it is impossible to determine from the proposal whether the benefits of excluding these areas would outweigh the benefits of including them as critical habitat.

Our Response: We agree that it is difficult to determine the relative costs and benefits of critical habitat designation without benefit of an economic analysis. It is precisely for this reason that the draft economic analysis was made available for review immediately upon completion on October 2, 2002, and the public comment period on the proposed critical habitat designations for these 61 species from the islands of Maui and Kahoolawe was extended until November 1, 2002. Maui units C1 and C2 have not been designated as final critical habitat. Maui unit C3 has been reduced to include only State owned lands within the conservation district and G1 and G5 have been reduced to lands within the conservation district. No costs are expected to occur from such impacts to water systems, because none of the plants are stream-dependent for their survival and therefore would not cause a reduction in water diversions. In addition, water infrastructures are considered a manmade feature and therefore its operation and maintenance are not subject to critical habitat provisions of section 7, because these features and structures normally do not contain, and are not likely to develop, any primary constituent elements.

(41) *Comment:* The DEA did not address, or did not adequately consider, a variety of costs and benefits that they believe could occur caused by the implementation of section 7 consultation for these species.

Our Response: Many of these possible costs were considered and some were addressed in the DEA. In many cases, however, potential costs were purposely not addressed in the DEA because they are not expected to occur. In other cases, it is possible for them to occur. In still other cases, the concerns no longer have substance given the Service's modifications to the proposed critical habitat. Finally, in some cases, the comments provided new information and costs were modified in section 4 of the Addendum.

(42) *Comment:* One commenter stated that the proposed designation fails to properly consider the importance of cooperation and goodwill between the Service and private landowners, and the impact critical habitat designations will have in discouraging voluntary partnerships on private lands. Haleakala Ranch stated that if critical habitat were designated on ranch lands, the ranch would cease participation in conservation projects designed to promote endangered species recovery. The ranch also stated that access to Haleakala Ranch land will be denied to those seeking data about the presence of the listed species, and future partnerships, existing agreements, and a land steward position may be terminated in an effort to insulate the company from outside governmental oversight. The ranch prefers to work cooperatively with the Service and other conservation entities to continue its legacy of land stewardship. Ulupalakua Ranch stated that designation of critical habitat would result in discontinuation of its associations with organizations associated with native plant restoration. Ulupalakua Ranch will also deny access to those interested in plant conservation and would not allow reintroductions of any native plants to its private property. Similarly, Alexander and Baldwin, Inc. cautioned the Service to carefully consider the benefits of existing cooperative agreements such as the East Maui Watershed Partnership and the potentially chilling effect that designation might have on such agreements. The Estate of James Campbell also stated a preference for encouraging the establishment of voluntary partnerships with landowners to effectuate the desired species conservation. This commenter further stated that the regulatory approach discourages the cooperation which has been a key to successful species conservation. Another commenter stated that if the Service truly wants to carry out its mission statement and ''work with others to conserve, protect and enhance fish, wildlife and plants, and their habitats for the continuing benefit of the American people,'' they should meet with the community of the DHHL Kahikinui homesteads to explain in clear and concise terms what is being proposed and exactly how it may impact our community. Others expressed similar concerns that cooperation and on-the-ground management were more important than critical habitat designation.

Our Response: Chapter VI, Section 4.j. of the DEA discusses the potential for reduced cooperation with the Service on conservation projects as a result of critical habitat. The DEA determines that a modest but undetermined reduction in cooperation may occur, along with a corresponding but undetermined environmental loss to society. However, as the comment indicates, the Service received letters from two landowners, Ulupalakua Ranch and Haleakala Ranch, during the public comment period stating that they will no longer participate in conservation projects designed to assist native plant species if critical habitat is designated on their land. Over the past three years alone, these landowners have participated in more than seven different conservation projects, receiving more than $290,000 from the Service or Natural Resources Conservation Service (NRCS). This funding is often matched by the landowner, and thus the cost of these projects likely exceeds $580,000. While the benefits of these projects are difficult to quantify (as discussed further in section 6 of the Addendum), the biological value of these projects to the native plants is at minimum equal

to the costs of each project. Assuming that participation over the past three years is indicative of the average level of participation, over a period of ten years, the value of the conservation projects would exceed $1.7 million. Thus, a reduction in cooperation in conservation projects by these two landowners could be expected to result in a corresponding environmental loss to society of more than $1.7 million. In addition, these landowners have indicated that they will not allow outside individuals, agencies or organizations to monitor, investigate, or collect data about native plants on their lands. In qualitative terms, the total loss to society as a result of reduced cooperation in conservation projects could be considered significant.

(43) *Comment:* The DEA fails to consider economic impacts of critical habitat that result through interaction with Hawaii Land Use Law. Critical habitat could result in changes to zoning under State law. There is an overriding directive under State law that endangered plant species are to be protected in the State's planning and zoning process. HRS § 205–2(e) states that Conservation Districts shall include areas necessary for conserving endangered species. HRS 195D–5.1 states that DLNR shall initiate amendments in order to include the habitat of rare species. Even if DLNR does not act, the Land Use Commission may initiate such changes, or they may be forced by citizen lawsuits. Areas for endangered species are placed in the protected subzone with the most severe restrictions. While existing uses can be grandfathered, downzoning will prevent landowners from being able to shift uses in the future, will reduce market value, increase property tax, and make the land unmortgageable. Although the Service acknowledges that there could be substantial indirect costs relating to redistricting of land to the Conservation District, several commentators disagreed with the characterization of these costs as ''minor'' and with the statement that the probabilities of redistricting is ''slight to small.''

Our Response: In our economic analysis we indicated that about 8,770 ha (21,670 ac) of Agricultural lands would be included in the designation, of which 4,443 ha (10,980 ac) is privately owned. However, in this final rule, we have designated critical habitat on only 5,170 ha (12,744 ac) of Agricultural lands on Maui and Kahoolawe; the remaining Agricultural lands were excluded from the final designation pursuant to section 4(b)(2). Of this, approximately 15 percent, or 794 ha (1,960 ac), is owned by private landowners. The primary activity that takes place on privately-owned agriculturally-zoned land is ranching. The economic analysis found that reduction in land values that would be caused by redistricting privately owned land from Agricultural to Conservation District ranges from $1,000 to $10,000 per acre. Since 1,960 acres of Agricultural land are privately owned, if all such lands were redistricted, the total loss would range from $1,960,000 to $19,600,000. Even if a landowner has no plans to sell the land, the loss in land value due to redistricting could reduce potential mortgage financing. However, as discussed in the economic analysis, the redistricting of all Agricultural land to Conservation is a worst-case scenario, and one which is not envisioned for several reasons.

HRS section 195D–5.1 states that the Department of Land and Natural Resources (DLNR) ''shall initiate amendments to the conservation district boundaries consistent with section 205–4 in order to include high quality native forests and the habitat of rare native species of flora and fauna within the conservation district.'' HRS section 205–2(e) specifies that ''conservation districts shall include areas necessary for * * * conserving indigenous or endemic plants, fish and wildlife, including those which are threatened or endangered * * *'' Unlike the automatic conferral of State law protection for all federally listed species (*see* HRS 195D–4(a)), these provisions do not explicitly reference federally designated critical habitat and, to our knowledge, DLNR has not proposed amendments in the past to include all designated critical habitat in the Conservation District. Nevertheless, according to the Land Division of DLNR, DLNR is required by HRS 195D–5.1 to initiate amendments to reclassify critical habitat lands to the Conservation District (Deirdre Mamiya, Administrator, Land Division, in litt. 2002).

State law only permits other State departments or agencies, the county in which the land is situated, and any person with a property interest in the land to petition the State Land Use Commission (LUC) for a change in the boundary of a district. HRS section 205–4. The Hawaii Department of Business, Economic Development & Tourism's (DBEDT) Office of Planning also conducts a periodic review of district boundaries taking into account current land uses, environmental concerns and other factors and may propose changes to the LUC.

The State Land Use Commission determines whether changes proposed by DLNR, DBEDT, other state agencies, counties or landowners should be enacted. In doing so, State law requires LUC to take into account specific criteria, set forth at HRS 205–17. While the LUC is specifically directed to consider the impact of the proposed reclassification on ''the preservation or maintenance of important natural systems or habitats,'' it is also specifically directed to consider five other impacts in its decision: (1) ''maintenance of valued cultural, historical, or natural resources;'' (2) ''maintenance of other natural resources relevant to Hawaii's economy, including, but not limited to, agricultural resources;'' (3) ''commitment of state funds and resources;'' (4) ''provision for employment opportunities and economic development;'' and (5) ''provision for housing opportunities for all income groups, particularly the low, low-moderate, and gap groups.'' HRS 205.17. Approval of redistricting requires six affirmative votes from the nine commissioners, with the decision based on a ''clear preponderance of the evidence that the proposed boundary is reasonable.'' HRS 205–4.

Thus, even if all federally designated critical habitat is petitioned for redistricting, the likelihood of redistricting will vary parcel by parcel. While the LUC may redistrict some parcels, it is unlikely that lands with a high economic value to the community, such as lands with significant State investments, prime agricultural land, land planned for the economic and community development, and land planned for the provision of housing, would be redistricted. By way of illustration, in the last State district boundary review only five privately owned parcels were redistricted to Conservation even though several hundred parcels were proposed for redistricting (Addendum). While concern has been expressed that a third party would challenge a decision by the LUC not to redistrict a critical habitat parcel in State court, State courts have been deferential to the LUC decisions if they are supported by the record, consistent with statutory provisions, and not affected by errors. *See, e.g., Kilauea Neighborhood Ass'n.* v. *Land Use Comm'n.* 751 P.2d 1031, 1035 (Haw. Ct. App. 1988) (finding that, although LUC's findings were poorly drawn, the record provided sufficient support for the decision); *Outdoor Circle* v. *Harold K.L. Castle Trust Estate,* 675 P.2d 784, 793 (Haw. Ct. App. 1983) (upholding LUC's decision as consistent

with statutory provisions and not affected by errors).

(44) *Comment:* A commenter stated that the DEA fails to consider economic impacts of critical habitat that result through interaction with State law, specifically Hawaii Environmental Impact Statement Law. HRS 343–5 applies to any use of conservation land, and a full Environmental Impact Statement is required if any of the significance criteria listed in HAR 11–200–12 apply. One of these criteria is that an action is significant if it ''substantially affects a rare, threatened or endangered species or its habitat.'' This will result in costly procedural requirements and delays. Another commenter expressed concerns that the Service may get involved in county permitting processes (as it did when Ulupalakua Ranch requested a Special Use Permit from the County of Maui for telecommunication purposes). Multiple commenters also stated the following: The DEA fails to evaluate the practical effect critical habitat designation will have on development. The draft fails to quantify the indirect costs that critical habitat designation could cause by making the process of obtaining State and county permits for development more difficult, expensive, and time consuming. Similarly, it should take into account the delays and additional cost to ensure compliance with Federal regulations. Special Management Area permits administered by Maui County as required by Hawaii's Coastal Zone Management Act will be harder to get, will result in delays, will cause a decline in property values and may make it impossible to develop. This economic impact disappears because the DEA's bottom line erroneously counts only so-called ''direct'' costs of consultation.

Another commenter also stated that the Service has taken the position in other States that it has a right to intervene in local land use proceedings if they affect endangered species on private property. For example, the Service petitioned the local zoning board in Arizona to postpone approval of a rezoning petition pending a survey to determine the extent to which an endangered plant was present on the property even though no Federal approval was being sought. The failure of the Service to address this type of activity in the DEA is a fundamental error of the analysis.

Our Response: Adverse impacts on development, including, but not limited to, delays for additional studies and agency reviews, increased costs for environmental studies, increased risk of project denials, increased risk of costly mitigation measures, increased risk of litigation over approvals, are not expected since there are no known development plans within the designation. Furthermore, the following factors make future development projects in the proposed critical habitat unlikely: (1) As modified, approximately 80 percent of the proposed critical habitat is in Conservation District where development is severely limited; (2) the approximately 20 percent of the proposed critical habitat in the Agricultural district is in remote areas, areas lined with gulches or steep cliffs, or areas with limited access to water; (3) there are no known plans for development within the final critical habitat; and (4) most of the land designated in the Special Management Area is also within the Conservation District.

(45) *Comment:* The DEA fails to consider economic impacts of critical habitat that result through interaction with State law, specifically the State Water Code. HRS 174C–2 states ''adequate provision shall be made for protection of fish and wildlife.'' HRS 174C–71 instructs the commission of Water Resource Management to establish an in-stream use protection program to protect fish and wildlife. Another commenter was concerned that critical habitat is proposed in watershed areas in which stream or irrigation system water flows. This commenter also stated the following: The proposed rule states that activities such as watershed alteration or water diversion may trigger section 7 consultations if there is Federal involvement. If the ability to divert or take water from these sources or systems is restricted or limited, the impact would be far reaching and affect all lands served by such water sources or systems. The Service has an obligation to thoroughly investigate this issue and refrain from designating critical habitat until it has determined whether its actions will affect water use and balance this against any benefit to the species.

Our Response: No costs are expected to occur from such impacts to water systems, because none of the listed plants are aquatic and therefore would not cause a reduction in water diversion. In addition, water infrastructure is considered a manmade feature and therefore its operation and maintenance are not subject to critical habitat provisions of section 7, because these features and structures normally do not contain, and are not likely to develop, any primary constituent elements.

(46) *Comment:* A commenter expressed concerns that opponents of water diversions may use critical habitat as a tool to delay, and effectively stop, many worthwhile water diversion projects.

Our Response: Maui County and Department of Water Supply (DWS) submitted specific information regarding planned projects in the proposed critical habitat during the public comment period. Possible and planned projects by the DWS include water source development in Unit B2; construction of a water reservoir adjacent to Unit L; access and intake improvements in Unit L; and repair and maintenance of existing flumes in Unit L. As noted earlier, the Service removed Unit B2 from the final designation. Thus, no section 7 costs would be anticipated to result from future DWS projects in this area. Moreover, most of the identified DWS projects in Unit L involve repair and maintenance of existing manmade features and structures, and as such, would not be subject to section 7 consultation. However, to the extent that the planned improvements go beyond repair and maintenance and would be subject to section 7 consultation caused by Federal funding or permitting, the DEA's estimate of zero to two consultations reasonably reflects the potential number of section 7 consultations over the next 10 years (see Chapter VI, Section 3.k. of the DEA). The DEA estimates that the consultations could cost up to $68,000 with project modifications that could range up to $200,000.

(47) *Comment:* Several commenters stated that the DEA focuses primarily on the costs of critical habitat and lacks a thorough benefits analysis. It does not include the benefits of watershed protection and improvement or protection of other stream and riparian biota; the value of the listed plants as an indicator of ecological health; the value of protecting culturally significant species; the value that Hawaii's people place on conservation of Hawaiian plants; and the benefits of keeping other native species off the endangered species list, of maintaining water quality and quantity, of promoting ground water recharge, and of preventing siltation of the marine environment, thus protecting coral reefs. The Service cannot exclude land from critical habitat designation if it considers only the costs, and not the benefits, of critical habitat designation. In failing to discuss these benefits, the Service missed an opportunity to educate the public regarding the value of protecting native species and native ecosystems. The Service must use the tools available,

such as a study by the University of Hawaii (UH) Secretariat for Conservation Biology that estimated the value of ecosystem services, to quantify the benefits of critical habitat. Conversely, another commenter stated that the alleged benefits are entirely speculative and unquantifiable, and that the listed plants are of no use to anyone and lack commercial value. Another commenter points out that according to the DEA summary of costs and benefits, the benefits of designating critical habitat are ''difficult to estimate'' and are exceeded by the costs. Accordingly, the Service should exclude areas covered by the DEA from designation.

Our Response: There is little disagreement in the published economic literature that real social welfare benefits can result from the conservation and recovery of endangered and threatened species (Bishop 1978, 1980; Brookshire and Eubanks 1983; Boyle and Bishop 1986; Hageman 1985; Samples *et al.* 1986; Stoll and Johnson 1984). Such benefits have also been ascribed to preservation of open space and biodiversity (see examples in Pearce and Moran (1994) and Fausold and Lilieholm (1999)), both of which are associated with species conservation. Likewise, a regional economy can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.

Chapter VI, Section 6 of the DEA discusses potential benefits, both direct and indirect, that can result from the proposed designation. The DEA notes that the proposed designation can create ecological and cultural benefits such as the ones mentioned in the above comment—*e.g.*, ethnobotanical value of plants to the Native Hawaiians and social welfare benefits of ecological improvements. However, the DEA also indicates that these benefits are not quantified due to lack of information available on: (1) Quantified data on the value of the Maui and Kahoolawe species, and (2) quantified data on the change in the quality of the ecosystem and the species as a result of the designation. The DEA, however, does not conclude that the benefits are exceeded by the costs. Instead, it discusses the benefits that could result from critical habitat designation in qualitative terms.

While section 4(b)(1)(A) of the Act stipulates that listing determinations must be made solely on the basis of biological evidence, section 4(b)(2) of the Act, which calls for the establishment of critical habitat for all listed species if it is prudent and determinable, adds that the Secretary should take into consideration the economic impact of the designation and any other relevant impacts before specifying any particular area as critical habitat. Hence, an economic analysis is part of the process of designating critical habitat. Section 4(b)(2) of the Act provides the Secretary with broad discretion to take into consideration the economic impacts of any proposed critical habitat designation and exclude areas where she finds that the benefits of exclusion outweigh the benefits of designation.

The Secretary may exclude any area from critical habitat if she determines that the benefits of exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless she determines, based on the best scientific and commercial data available, the failure to designate such area as critical habitat will result in the extinction of the species concerned (16 U.S.C. 1533(b)(2)).

Thus, the Secretary is not required to find that the benefits of inclusion outweigh the costs of inclusion before designating an area, nor is the Secretary required to exclude an area from critical habitat if she determines that the benefits of exclusion outweigh the benefits of inclusion. Rather, the Act provides the Secretary with the discretion to take economic and other considerations into account when designating critical habitat.

As such, the DEA and the Addendum serve to illustrate possible impacts that can result from the designation, whether in the form of costs or benefits. However, the DEA and the Addendum are not intended to provide a comprehensive analysis of the benefits that could result from section 7 of the Act in general, or of critical habitat in particular. In short, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected costs of the rulemaking. The DEA and the Addendum simply provide information for the Secretary to exercise her discretion, but do not provide definitive conclusions or recommendations as to what areas, if any, should be excluded from the final designation.

Finally, although the UH study does value ecosystem services, it has limited applicability for valuing the benefits of the proposed critical habitat designation for the plants for a number of reasons. First, the UH study had a different purpose, which was to estimate the total value of environmental benefits provided by the entire Ko'olau Mountains on the island of Oahu versus the value of the more limited benefits provided by the proposed critical habitat for the plants on the islands of Maui and Kahoolawe. Consistent with its purpose, the UH study provided no estimates of the changes in environmental conditions resulting from changes in land and stream management due to critical habitat designation.

Furthermore, many of the assumptions and much of the analysis in the UH study are not transferable to the economic analysis for the plants' critical habitat. For example, the value of water recharge in the UH study reflects projected water supply and demand conditions on Oahu—an island ¾ of the size of Maui but with a population of nearly ten times that of Maui. Also, the UH benefit analysis of reducing soil runoff is unique to three valleys that drain through partially channelized streams in urban areas into the manmade Ala Wai Canal. Since this canal was designed with inadequate flushing from stream or ocean currents, it functions as an unintended settling basin that must be dredged periodically. In addition, the recreational and ecotourism values provided in the UH study apply to areas that are accessible to most hikers, which is not the case with significant portions of the plants'critical habitat. Significant portions of the plants' critical habitat units are in mountainous range with steep slopes and difficult access and on coastal cliffs.

(48) *Comment:* Critical habitat does not benefit ecotourism by creating new special places for people to visit, as the DEA suggests. Rather, it helps to protect the special places that already exist from degradation, ensuring that they will be around in the future to attract future ecotourists. Moreover, the Service's subjective preference that commercial operators not feature visits to view threatened and endangered plants has no place in an objective economic analysis.

Our Response: Chapter VI, Section 6.b.(1) of the DEA indicates that the proposed critical habitat may enhance the appeal of ecotourism by providing a marketing dimension. However, the DEA also states that this benefit may be slight since these places may already be regarded as special due to the existing natural and cultural resources in the area.

(49) *Comment:* The DEA underestimates economic costs because they are limited to what is likely to occur within 10 years. Critical habitat designation is permanent and not automatically revised if there is new evidence of the benefits of

nondesignation, or if the species is delisted.

Our Response: A listed species is delisted when it is recovered or has become extinct. Recovery is defined as no longer needing the protections provided by the Act, which includes critical habitat. As such, when a species is delisted, its critical habitat would be simultaneously ''undesignated.''

Furthermore, a 10-year time horizon is used because many landowners and managers do not have specific plans for projects beyond 10 years. In addition, the forecasts in the analysis of future economic activity are based on current socioeconomic trends and the current level of technology, both of which are likely to change over the long term.

(50) *Comment:* The DEA dismisses concerns about impacts on the use of structures and features already in place in areas to be designated as critical habitat. The draft concedes that the lack of clarity can force landowners to incur costs to investigate the implications of the regulations. The estimate that this will only take 15–40 hours is too low given the size of the designated areas, the vagueness of the regulatory exclusion, and the real costs of obtaining development approvals.

In addition, the DEA's analysis of potential costs expected to be incurred by private landowners to investigate the implications of critical habitat on their lands is flawed, because the analysis fails to recognize that the cost to investigate the implications of CH are sunk costs associated with the designation process, not additional costs that the final designation would impose.

Our Response: The DEA recognized that some landowners might spend a great deal of time investigating the implications of critical habitat, while others might not spend any time. The costs reported in the DEA reflect a reasonable estimate of total costs for all landowners, based on an estimate of the number of landowners who are likely to investigate the implications of critical habitat. The Addendum revised this number upwards in response to public comment. However, on further reflection, the estimate contained in the DEA better reflects an average estimate for all affected landowners for the following reasons. The estimate takes into account whether their land is in areas that are unsuitable for development due to mountainous terrain and/or being in the Conservation District. The analysis also assumes an average cost per landowner to investigate the implications of critical habitat. Public comment did not offer an alternative estimate of time or costs that would support changing the estimate in the DEA. Thus the estimates of hours spent and costs incurred remain the same as they appear in the DEA.

(51) *Comment:* One commenter stated the following: The DEA fails to consider the economic impacts of listing and critical habitat that result through interaction with State law, specifically Hawaii's Endangered Species Act. The commenter suggested that *New Mexico Cattle Growers Association* v. *U.S. Fish and Wildlife Service* requires consideration of the impact of listing as well as the impact of designating an area as critical habitat. Instead, the analysis is expressly limited to the impact of Federal agency consultation under the jeopardy standard. Since Federal listing triggers listing under State law, the Service must consider the impact of take prohibitions under State law (and consequently Federal law, which prohibits destruction of plants in knowing violation of State law). Violations of these laws can trigger lawsuits.

Our Response: The DEA and the Addendum consider the economic impacts of section 7 consultations related to critical habitat even if they are attributable co-extensively to the listed status of the species. In addition, the DEA and the Addendum examine any indirect costs of critical habitat designation; however, where it is the listing of a species that prompts action at the State or local level, the impacts are not attributable to critical habitat designation. Take prohibitions under Hawaii law are purely attributable to a listing decision and do not occur because of critical habitat designations. There are not take prohibitions associated with the plants critical habitat.

(52) *Comment:* Multiple commenters opposed the designation of agricultural lands needed to support agriculture and ranching. They stated that critical habitat designation would reduce property values and the ability to develop lands that were previously planned for development. Approximately 77 percent of the proposed designated land is within the State Conservation District, which includes irrigation water essential to agriculture. The rest of the lands proposed for designation are in the State Agricultural District. Designation of agricultural lands could prevent a farmer or rancher from using those lands since the very nature of those uses would in all likelihood entail cutting, uprooting, or injuring plants to a certain extent. The DEA fails to examine the economic impact of a landowner not being able to use his own land for fear of injuring a species he doesn't even recognize. No protection is afforded to farmers who unwittingly ''harm'' the designated critical habitat. A careful cost-benefit analysis should conclude that agricultural lands should be excluded.

Our Response: There are no take provisions associated with critical habitat. The Act requires only that Federal agencies consult with the Service to ensure that activities they fund, authorize, or carry out do not result in destruction or adverse modification of critical habitat. Because consultation under section 7 only applies to activities that have Federal involvement, the designation of critical habitat does not afford any additional protections for listed species with respect to strictly private activities. As such, designation of critical habitat on agricultural lands would not prevent a private farmer or rancher from farming or ranching on their land, unless the activity had Federal involvement, such as through participation in federally sponsored agricultural or ranching programs.

Chapter VI, Section 3.g. of the DEA presents estimates of section 7 costs associated with participation in federally sponsored agricultural or ranching related programs, such as Farm Bill programs administered by NRCS. The DEA bases its estimate of two to eight consultations over the next 10 years on the amount of Agricultural land contained within the proposed designation; number of past projects located within the area proposed for designation; and the possibility that some landowners could decide not to participate in future programs to avoid Federal involvement in their activities.

The Service reduced the amount of Agricultural land designated from 29,175 ac (11,806 ha) to 21,670 ac (8,770 ha), a reduction of 25 percent. The designation contains approximately 10,980 ac (4,443 ha) of Agricultural land owned by those most likely to participate in NRCS programs. However, the majority of this land, approximately 9,028 acres, is owned by two landowners who indicated during public comment that they will not participate in future NRCS programs if their land was designated as critical habitat. Moreover, as noted in the DEA, not all of the Agricultural land designated is in active agricultural use. Finally, competition for NRCS funding is strong. Based upon the final critical habitat designation and the new information, the Addendum adjusts the direct section 7 costs accordingly. The Addendum estimates that the consultation cost can range from $0 to

$41,200, with a project modification cost ranging $0 to $100,000.

Other indirect impacts that could result from the designation of critical habitat are discussed in Chapter VI, Section 4 of the DEA and Section 5 of the Addendum. First, the critical habitat designation may reduce property value of these Agricultural lands. In the worst case scenario, one which is not envisioned, reduction in land values due to redistricting all Agricultural land to the Conservation District could range from $11 million to $110 million. In addition, critical habitat could result in the cessation of existing agricultural activities. While the likelihood of this being mandated as a result of critical habitat designation is low, the estimated costs resulting from stopping all ranching activities within the designation ranges form $110,000 to $825,000 per year.

(53) *Comment:* Many commenters stated that the DEA fails to adequately assess the scope of indirect costs associated with critical habitat designation. Indirect impacts cannot be dismissed just because it is difficult to assign a dollar value to them. Without acknowledging the full scope of direct and indirect costs, the Service cannot complete an accurate final determination of critical habitat. Another commenter also stated that the DEA should be amended to properly reflect all economic impacts, including the various indirect impacts, which would clearly show that the economic costs of critical habitat designation are significantly higher than the benefits.

Our Response: Chapter VI, Section 4 of the DEA and Section 5 of the Addendum discuss various indirect impacts that can result from the designation. There is considerable uncertainty on whether any or all of these indirect impacts may occur, as they depend upon actions and decisions by entities other than the Service under circumstances for which there is limited or no history that can be used to determine the probability of different outcomes. Thus, based on the available information, these impacts were discussed qualitatively in the DEA and where possible, estimates were given of worst-case scenarios for illustrative purposes.

(54) *Comment:* Several commenters stated that critical habitat designation has the potential to decrease the amount of available hunting lands and game animals. Governmental officials seem to value plants and insects more than hunting, which is an important family and cultural tradition, a means of subsistence, and a way of life. Members of all ethnic groups hunt and depend on subsistence activities as a real part of their income. Hunting also contributes to the economy via money spent on pet foods, inter-island trips, gasoline, supplies, etc. Additionally, DLNR will lose money as the demand for hunting licenses and tag fees dwindles. The DEA does not adequately reflect the costs associated with management of game mammals and loss of hunting lands. Another commenter questioned why a cost was associated with project modifications to the management of game hunting on State managed lands because Maui does not have any State hunting areas that are managed to maintain or enhance game mammal populations. The commenters also questioned the methodology used to estimate the project modification cost.

Our Response: Chapter VI, Section 3.a.(2) and Section 4.a. of the Addendum discuss the direct economic impact of critical habitat designation on federally funded game management activities by estimating the direct section 7 costs associated with consultation and project modifications. The DEA makes the assumption that the cost of past project modifications only incorporates the portions of the hunting units that overlap with the occupied proposed critical habitat. However, information received during public comment noted that the prior consultation already modified the State's proposed game mammal program to address potential impacts to habitat everywhere on the island, including occupied and unoccupied habitat and areas inside and outside of critical habitat designation, based on the understanding that increasing game mammal populations in one location where the plants are not present may cause those mammals to move to areas where the plants are present and cause destruction. Upon further review of past consultations and past project modifications, the project modification costs are now estimated at $23,000 to $37,000. As noted in the DEA, because Maui does not have any State hunting areas that are managed to maintain or enhance game mammal populations, project modifications are anticipated to be similar to those in the past. They are not anticipated to include closure of hunting areas. In addition, as noted in the DEA, DLNR is likely to avoid costly project modifications by using Federal funds for game management projects that do not adversely affect listed species or their critical habitat, and if needed use only State funds on projects that the Service believes could have adverse impacts.

Chapter VI, Section 4.b. of the DEA and Section 5.a. of the Addendum discuss the potential indirect impact of critical habitat on the management of game mammals. The DEA notes that section 7 of the Act by itself does not require DLNR to manage State hunting lands to protect critical habitat; assure the survival and conservation of listed species, or participate in projects to recover species for which critical habitat has been established. Moreover, the DEA notes that critical habitat designation does not require: (1) Creating any reserve, refuge, or wilderness areas; (2) fencing for any reason; (3) removing ungulates; or (4) closing areas to hunters. However, the DEA recognizes that a change in game-management strategy is possible as a result of a lawsuit or as a voluntary decision by DLNR. For illustrative purposes, Chapter VI, Section 4.b. of the DEA and Section 5.a. of the Addendum present potential costs that could result if DLNR removed areas within the designation from the State-managed hunting units. Assuming that about half of those who hunt game mammals on the affected lands were to give up hunting, then hunting activity on Maui could drop by about 14.5 percent. This drop in hunting activity would translate into a decrease in annual economic activity related to hunting on Maui of about $290,000 in direct sales (14.5 percent of $2 million); $510,000 in total direct and indirect sales (14.5 percent of $3.5 million); nine jobs (14.5 percent of 60 jobs); and $170,000 in income (14.5 percent of $1.2 million). However, the decrease in expenditures by the displaced hunters would probably be spent on other recreational activities, goods, and services, so these figures are likely to overstate the economic costs. In addition to the change in economic activity discussed above, a reduction in hunting activity in critical habitat would also result in a loss in value or benefit to hunters (consumers' surplus). Section 5.a. of the Addendum estimates this loss in value at $150,000 annually and recognizes that benefits derived from recreational activities that replace game mammal hunting would partially offset this loss.

(55) *Comment:* Three parcels (TMK (2) 1–8–001:003, TMK (2) 3–1–001:004, and TMK (2) 3–1–002:011) should be excluded from designation, because the DEA fails to establish that the benefits of including these parcels in the designation outweigh the costs of including these parcels in the designation.

Our Response: The Service removed two of the three parcels mentioned in the comment—*i.e.*, TMK (2) 3–1–001:004 and TMK (2) 3–1–002:011 from the proposed designation. The

remaining parcel—*i.e.*, TMK (2) 1–8–001:003—is approximately 710 acres (4 ha) in the Agricultural District, and this would remain within the designation. Chapter VI, Section 3.g. of the DEA and Section 4.e. of the Addendum discuss activities on Agricultural land and specifically recognizes that some of the State managed Agricultural land is leased out to private entities as pasturage. However, no direct section 7 costs involving these leases are anticipated because there is no known Federal involvement.

While section 4(b)(1)(A) of the Act stipulates that listing determinations must be made solely on the basis of biological evidence, section 4(b)(2) of the Act, which calls for the establishment of critical habitat for all listed species if it is prudent and determinable, adds that the Secretary should take into consideration the economic impact of the designation and any other relevant impacts before specifying any particular area as critical habitat. Hence, an economic analysis is part of the process of designating critical habitat. Section 4(b)(2) of the Act provides the Secretary with broad discretion to take into consideration the economic impacts of any proposed critical habitat designation and exclude areas where she finds that the benefits of exclusion outweigh the benefits of designation.

The Secretary may exclude any area from critical habitat if she determines that the benefits of exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless she determines, based on the best scientific and commercial data available, that the failure to designate such area as critical habitat will result in the extinction of the species concerned (16 U.S.C. 1533(b)(2)).

Thus, the Secretary is not required to find that the benefits of inclusion outweigh the costs of inclusion before designating an area, nor is the Secretary required to exclude an area from critical habitat if she determines that the benefits of exclusion outweigh the benefits of inclusion. Rather, the Act provides the Secretary with the discretion to take economic consideration into account when designating critical habitat.

As such, the DEA and the Addendum serve to illustrate possible impacts that can result from the designation, whether in form of costs or benefit. They provide information for the Secretary to exercise her discretion, but do not provide definitive conclusions or recommendations as to what areas, if any, should be excluded from the final designation.

(56) *Comment:* While the Service has stated that critical habitat affects only activities that require Federal permits or funding, and does not require landowners to carry out special management or restrict use of their land, they fail to address the breadth of Federal activities that affect private property in Hawaii and the extent to which private landowners are required to obtain Federal approval before they can use their property. These requirements extend to all State agencies using Federal funds in connection with a proposed action and community actions for which Federal approval or review is necessary. For example, if the Federal government approves eligibility for flood insurance, flood plain development programs shall become subject to consultations under the Act. Federal agencies such as the U.S. Department of Agriculture and the Federal Farm Services Agency (FFSA) have numerous programs that provide funds or other assistance to farmers and ranchers in the form of loans, grants, loan deficiency, and subsidy payments for certain commodities, marketing assistance, disaster assistance, and other financial, technical, and educational assistance. Participation in any such programs would be subject to section 7 consultation, thus making Federal assistance unavailable to the types of operations that these programs are designed to assist.

Our Response: The analysis in the DEA, as revised by the Addendum, is based on a review of all ''reasonably foreseeable'' projects, land uses, and activities that may be directly affected by the implementation of section 7 for the plants. ''Reasonably foreseeable'' projects, land uses, and activities are defined in the DEA as those which are: (1) Currently authorized, permitted, or funded; (2) proposed in plans currently available to the public; or (3) projected or likely to occur within next 10 years based on (a) recent economic or land-use trends, development patterns, evolving technologies, competitive advantages, etc., and (b) limits imposed by land-use controls, access, terrain, infrastructure and other restrictions on development. After determining the ''reasonably foreseeable'' projects, land uses, and activities that could affect the physical and biological features of the proposed critical habitat units, the next step in the analysis was to determine Federal involvement. Thus, the DEA does not evaluate all potential activities with Federal nexus; instead, the DEA is limited to those activities that were ''reasonably foreseeable.'' The results of this analysis are presented in Table VI–3 in the DEA and Table Add-2 in the Addendum.

(57) *Comment:* Two commenters wrote that lands in Urban, Agricultural, and Rural Districts are designated, used, and intended for a wide variety of land use activities. These commenters stated that there is a much greater likelihood, therefore, that critical habitat designation will have an adverse economic impact on these landowners.

Our Response: None of the critical habitat units are in the Urban or Rural District. In fact, 86 percent of the critical habitat designation is in Conservation District and 14 percent in Agricultural District. As discussed above, designation of the Agricultural lands may result in direct section 7 costs through federally sponsored agricultural or ranching related programs, such as Farm Bill programs administered by NRCS. The DEA bases its estimate of two to eight consultations over the next 10 years on the amount of Agricultural land contained within the proposed designation, the number of past projects located within the area proposed for designation, and the possibility that some landowners could decide not to participate in future programs to avoid Federal involvement in their activities.

(58) *Comment:* Several commenters stated that although the Service has expressed that designation of critical habitat does not create a reserve, refuge, or wilderness area; require fencing for any reason; close off areas to hunters, hikers, or other land users; or create a land management plan, many are concerned that critical habitat designation could result in limitations or special management requirements (such as fencing, removal of grazing animals, or control of invasive species) being established on private lands at great expense to the private and public. The Service's own recovery plans for many of the species in the proposed rule specifically identify cattle grazing as a potential threat to the species or their habitats. Many feel that it is likely that private party litigation will force the implementation of ''special management considerations or protection.'' An example of this is the worrisome precedent of *Palila* v. *Hawaii Department of Land and Natural Resources* in which the Sierra Club Legal Defense Fund sued the State of Hawaii under the Endangered Species Act and resulted in a Federal court order specifying that sheep and goats should be permanently removed from critical habitat designated for palila on the Big Island. The argument against this case being relevant for the plants critical habitat is not persuasive when it argues that palila cases are irrelevant to