
DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN/1018-AB42

Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Six Plants From the Island of Lanai, Hawaii

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: The U.S. Fish and Wildlife Service (Service) determines six plants, *Abutilon eremitopetalum* (no common name (NCN)), *Cyanea macrostegia* subsp. *gibsonii* (NCN), *Gahnia lanaiensis* (NCN), *Phyllostegia glabra* var. *lanaiensis* (NCN), *Tetramolopium remyi* (NCN), and *Viola lanaiensis* (NCN), to be endangered pursuant to the Endangered Species Act of 1973, as amended (Act). Five of these taxa are known only from the Lanaihale area of Lanai Island, Hawaii, and the sixth from Aualua Ridge in the northwestern part of the island. The six plants are threatened by one or more of the following: Habitat degradation and competition by naturalized, exotic vegetation; predation or habitat destruction by feral animals; and an increased potential for extinction resulting from stochastic events because of the small numbers of extant individuals and their restricted distribution. Potential threats include fire and destruction or damage to the taxa and their habitat as a secondary result of urbanization and development of the island. This rule implements the protection and recovery provisions afforded by the Act for these plants.

EFFECTIVE DATE: October 21, 1991.

ADDRESSES: The complete file for this rule is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, 300 Ala Moana Boulevard, room 6307, Honolulu, Hawaii 96813.

FOR FURTHER INFORMATION CONTACT: Derral R. Herbst, at the above address (808/541-2749 or FTS 551-2749).

SUPPLEMENTARY INFORMATION:

Background

Abutilon eremitopetalum, *Cyanea macrostegia* subsp. *gibsonii*, *Gahnia lanaiensis*, *Phyllostegia glabra* var. *lanaiensis*, and *Viola lanaiensis* are endemic to the island of Lanai; *Tetramolopium remyi* at one time also grew on West Maui, but presently is believed to be extinct on that island (Lowrey 1990). The island of Lanai is a small island totaling about 139 square miles (sq mi) (361 sq kilometers (km)) in area. Lanai is a shield volcano built by eruptions at its summit and along three rift zones; the principal rift zone runs in a northwesterly direction and forms a broad ridge whose highest point, Lanaihale, has an elevation of 3,370 feet (ft) (1,027 meters (m)). The entire ridge is commonly called Lanaihale, after its highest point. The only known extant populations of five of the six taxa in this rule are found on the summit, slopes, or valleys of Lanaihale; the sixth taxon is confined to Aualua Ridge in the northwestern part of the island. All six taxa are known only from privately-owned land. A Lowland Wet Forest community covers the summit and narrow valleys of Lanaihale. Lowland Wet Forest communities occur on the six largest Hawaiian Islands at about 300 to 4,000 ft (100 to 1,200 m) in elevation (Gagne and Cuddihy 1990). Although annual rainfall averages about 37 inches (in) (94 centimeters (cm)) in this vegetation type on Lanai, there is considerable cloud cover during most afternoons and nights, and fog drip nearly triples the annual precipitation (Ekern 1964). The substrate is primarily silty clay and clay (Foote *et al.* 1972). The vegetation is a mixture of native and exotic species with native 'ohi'a and uluhe fern (*Metrosideros polymorpha* and *Dicranopteris linearis*, respectively) being the dominant species. The known existing populations of *Cyanea macrostegia* subsp. *gibsonii*, *Gahnia lanaiensis*, *Phyllostegia glabra* var. *lanaiensis*, and *Viola lanaiensis* are members of this community.

Abutilon eremitopetalum, which grows on the dry leeward slopes and valleys of Lanaihale, and *Tetramolopium remyi*, which grows on Aualua Ridge on the northwestern part of the island, are members of the Lowland Dry Shrubland vegetation community. This vegetation type occurs in leeward situations on all of the main islands except Niihau and Kahoolawe, at about 330 to 1,970 ft (100 to 600 m) in elevation (Gagne and Cuddihy 1990). The land type is "Rock land;" "Very stony land, eroded;" and "Rock outcrop." The annual rainfall is about 10

to 25 in (25 to 64 cm), mostly falling between November and April (Foote *et al.* 1972). The vegetation comprises typical dry lowland plants such as luma (*Diospyros sandwicensis*), wiliwili (*Erythrina sandwicensis*), 'a'ali'i (*Dodonaea viscosa*), nehe (*Lipochaeta* spp.), and koa haole (*Leucaena leucocephala*).

Discussion of the Six Species

Abutilon eremitopetalum is based on a specimen collected by George C. Munro in Maunalei Valley, Lanai, in 1930 (Caum 1933; George Munro, *in litt.*, 1951). Edward L. Caum described it as a new species, naming it *A. cryptopetalum* because its petals were small and completely enclosed by the calyx (Caum 1933). *Abutilon cryptopetalum* Caum, a later homonym as the name had previously been given to an Australian species of the genus, was renamed *A. eremitopetalum* by Caum, maintaining the meaning of its original specific epithet (Christophersen 1934). In 1932, Otto Degener discovered a shrub in the Waianae Mountains of Oahu, which resembled an *Abutilon* except that it had reduced or "aborted" petals completely enclosed by the calyx. He established a new genus, *Abortopetalum*, for his discovery, basing the genus upon its short, enclosed petals which he believed to be a unique feature (Degener 1932). Degener later transferred Caum's species to his new genus, giving rise to the epithet *Abortopetalum eremitopetalum* (Degener 1936). Erling Christophersen (1934) noted that all characters of the genus *Abortopetalum* are encompassed within the morphological range of *Abutilon* and reduced Degener's genus to synonymy, a course accepted by all botanists except Degener.

Abutilon eremitopetalum is a shrub in the mallow family (Malvaceae) with grayish-green, densely hairy, heart-shaped leaves; the leaves are 2.5 to 5 in (7 to 12 cm) long. One or two flowers on stems up to 1.5 in (4 cm) long are in the leaf axils. The calyx of the flowers is green, cup-shaped, and about 0.5 in (1.5 cm) long. The petals are shorter than the calyx and are bright green on the upper surface and reddish on the lower surface. The staminal column extends beyond the calyx and is white to yellow, with red style branches tipped with green stigmas. The fruit is a hairy, brown, dry, cylindrical capsule and about 0.3 in (1 cm) long. It is the only *Abutilon* on Lanai whose flowers have green petals hidden within the calyx (Bates 1990).

Historically, *Abutilon eremitopetalum* was found in small, widely scattered colonies at elevations of between 700

and 1,000 ft (215 and 305 m) in the ahupua'a (geographical areas) of Kalulu, Mahana, Maunalei, Mamaki, and Paawili on the northern, northeastern, and eastern parts of Lanai Island (Caum 1933; Hawaii Heritage Program (HHP) 1990b, 1990c; G. Munro, *in litt.*, 1951). Today, about 30 (Hawaii Plant Conservation Center (HPCC) 1990a; Robert Hobdy, State Dept. of Land and Natural Resources, pers. comm., 1990) to 70 (HHP 1990a) individuals are known from a single population in Kahea Gulch on the northeastern part of the island. Habitat degradation and competition by encroaching exotic plant species such as lantana (*Lantana camara*), koa haole, and sourbush (*Pluchea carolinensis*) probably are the main threats to this species (HHP 1990a, HPCC 1990a). Browsing by axis deer (*Axis axis*) is another threat (HHP 1990a; HPCC 1990a; R. Hobdy, pers. comm., 1990). Although *Abutilon eremitopetalum* does not appear to be a preferred food of the deer, they will browse the species if other food sources become scarce. Grazing on grasses and forbs has the potential to promote soil erosion; this usually is limited to sheet erosion as the shrubs in the area prevent mass movement of the soil (R. Hobdy, pers. comm., 1990). Fire is another potential threat because the area is dry much of the year. The small number of extant individuals is in itself a considerable threat, as the limited gene pool may depress reproductive vigor, or a single natural or man-caused environmental disturbance could destroy the only known existing population. Cattle (*Bos taurus*) are known to have destroyed the plants in the past (G. Munro, *in litt.*, 1951), but today are not a problem as the island is no longer a cattle ranch.

Cyanea macrostegia subsp. *gibsonii* was first collected by William Hillebrand in July, 1870, "on the highest wooded ridge" (Lanaihale) of the island of Lanai (Rock 1919). Hillebrand, a medical doctor and author of "Flora of the Hawaiian Islands," named his new species *Cyanea gibsonii* in honor of Walter Murray Gibson (Hillebrand 1888), a Mormon missionary who had established a settlement on the island and later became a notorious figure in Hawaiian politics. The type specimen was deposited in the Berlin Herbarium, which was destroyed in 1943; in 1988 an isotype in the National Herbarium of Victoria, Melbourne, Australia, was designated as the lectotype (Lammers 1988). In 1987, Harold St. John, questioning the validity of the characters used to delineate the genus *Cyanea*, transferred all species of *Cyanea* to the closely related genus *Delissea* (St. John 1987, St. John and

Takeuchi 1987). Few botanists have accepted St. John's taxonomy for this group; the majority continue to recognize the genus *Cyanea* (Lammers 1990). Several botanists noted the similarity between *C. gibsonii* and a Maui species of *Cyanea*, *C. macrostegia* (Rock 1919, Wimmer 1943), the Lanai plant differing only in that it has a curved (rather than suberect) corolla. Thomas Lammers, the latest monographer of the Hawaiian members of this family, believed that it would be more appropriate to treat the two as conspecific subspecies and published the new combination and status in 1988.

Cyanea macrostegia subsp. *gibsonii*, a member of the bellflower family (Campanulaceae), is a palm-like tree 3.2 to 23 ft (1 to 7 m) tall. The leaves are elliptic or oblong, about 8 to 31 in (20 to 80 cm) long and 2.5 to 8 in (6.5 to 20 cm) wide; the upper surface usually is smooth, while the lower is covered with fine hairs. The leaf stem often is covered with small prickles throughout its length. The inflorescences are horizontal and clustered among the leaves, each bearing 5 to 15 curved flowers which are blackish-purple externally and white or pale lilac within. The fruit is a yellowish-orange berry about 0.6 to 1.2 in (1.5 to 3 cm) long. The following combination of characters separates this taxon from the other members of the genus on Lanai: calyx lobes oblong, narrowly oblong, or ovate in shape; and the calyx and corolla both more than 0.2 in (0.5 cm) wide (Lammers 1990, Rock 1919, Wimmer 1943).

Cyanea macrostegia subsp. *gibsonii* historically is documented from the summit of Lanaihale and the upper parts of Mahana, Kaiholena, and Maunalei valleys of Lanai Island (Lammers 1990, Rock 1919). It presently is known from two gulches in upper Kaiholena Valley and one of the feeder gulches into Maunalei Valley. The Maunalei population was last seen in the late 1980's and, although its habitat showed signs of disturbance, was the healthiest of the three populations (R. Hobdy, pers. comm., 1990). In 1989, only a single plant could be found at one of the Kaiholena sites, and it was being overgrown by kahili ginger (*Hedychium gardnerianum*) (R. Hobdy, pers. comm., 1990). Browsing by deer and encroaching exotic species of plants are the main threats (R. Hobdy, pers. comm., 1990). The small number of extant individuals also is a threat, as the limited gene pool may depress reproductive vigor, or any natural or man-caused environmental disturbance could destroy the only known existing population.

Gahnia lanaiensis was first collected by Otto and Isa Degener on "Lanai, east of Munro Trail and north of Lanai-hale, in shrubby rainforest at 3,000 ft., Sept. 4, 1963 * * *" (Degener and Degener 1965). The following year, the Degeners and J.H. Kern published the new taxon, naming it for the island on which it grows (Degener *et al.* 1964). The species is considered endemic to the island of Lanai, but is very closely related to *G. melanocarpa* of eastern Australia (Koyama 1990).

Gahnia lanaiensis, a member of the sedge family (Cyperaceae), is a tall (5 to 10 ft (1.5 to 3 m)), tufted, perennial, grass-like plant. This sedge may be distinguished from grasses and other genera of sedges on Lanai by its spirally arranged flowers, its solid stems, and its numerous, three-ranked leaves. *Gahnia lanaiensis* differs from the other members of the genus on the island by its achenes (seed-like fruits), which are 0.14 to 0.18 in (0.35 to 0.45 cm) long and purplish-black when mature (Koyama 1990).

Gahnia lanaiensis is known from 15 or 16 large clumped plants growing along the summit of Lanaihale (HHP 1990d to 1990f). The population extends for a distance of about 0.8 mi (1.3 km) between 3,000 and 3,360 ft (915 and 1,025 m) in elevation (HHP 1990d to 1990f). This distribution encompasses the entire known historic range of the species. The primary threat to this species is the small number of plants and their restricted distribution, which increases the potential for extinction from stochastic events. Potentially, a long-term threat to the species is posed by the planned development of the island. Presently, hotels are being built and a tourist industry is planned. The Munro Trail, which traverses Lanaihale, affords a beautiful view of the island and is sure to be popular with tourists. Approximately 30 percent of the known plants of *G. lanaiensis* grow along this trail system. Increased human use of the trail could lead to the destruction of individuals of the species. Disturbance of the soil or destruction of groundcover plants would increase the potential for erosion and open the area to invading exotic plants (Joel Lau, HHP, pers. comm., 1990). Manuka (*Leptospermum scoparium*), a weedy tree introduced from New Zealand, is spreading along Lanaihale, but has not yet reached the *Gahnia* area. However, manuka may expand its distribution into the remaining *Gahnia* habitat and may compete with *Gahnia* for space.

Phyllostegia glabra var. *lanaiensis* was first collected by Horace Mann, Jr., and William Tufts Brigham during the

year they spent collecting botanical specimens in Hawaii (May 1864 to May 1865). It is presumed that all collections of this taxon were made in the "mountains of Lanai," but the plant is known definitely only from Kaiholena Gulch. Earl E. Sherff described this variety in 1934, naming it for the island on which it grows (Sherff 1934).

Phyllostegia glabra var. *lanaiensis* is a robust, erect to decumbent, glabrous, perennial herb in the mint family (Lamiaceae). Its leaves are thin, narrow, lance-shaped, 3 to 9.5 in (8 to 24 cm) long and 0.6 to 1 in (1.6 to 2.5 cm) wide, often red-tinged or with red veins, and toothed at their edges. The flowers are in clusters of 6 to 10 per leaf axil, mostly only at the ends of branches. The flowers are white, occasionally tinged with purple, and are variable in size, about 0.4 to 1 in (1 to 2.5 cm) long. The fruit consists of four small, fleshy nutlets. Two varieties of *P. glabra* occur on Lanai. The variety *lanaiensis* can be distinguished from the variety *glabra* by its shorter calyx and narrower leaves. *Phyllostegia imminuta*, the only other member of the genus on Lanai, is a hairy plant with a calyx about 0.1 in (0.3 cm) long, while *P. glabra* lacks hair and has a calyx about 0.2 to 0.4 in (0.4 to 1.1 cm) long (Degener and Degener 1960, Fosberg 1936a, Sherff 1935b, Wagner *et al.* 1990).

Phyllostegia glabra var. *lanaiensis* has not been seen for several years. Last sighted in the 1980's, a single plant was seen in a gulch feeding into the back of Maunalei Valley (R. Hobdy, pers. comm., 1990). The gulches and valleys of Lanaihale are very rugged and have steep walls; consequently they are not explored with any regularity. Because no thorough recent surveys for this taxon have been conducted in this rugged terrain, the likelihood that this plant still exists is very good. Browsing by deer and invading, competing exotic plants are the two main threats to all the native vegetation within the historic range of this taxon (R. Hobdy, pers. comm., 1990).

Tetramolopium remyi was first collected on Maui, most likely in the foothills of western Maui, by Ezechial Jules Remy, between 1851 and 1855. In 1861, Asa Gray described the species as *Vittadinia remyi*, reducing the genus *Tetramolopium* to section of *Vittadinia* in the same publication (Gray 1861). William Hillebrand was the first to collect the species on Lanai. After reviewing previous work, he decided to maintain the genus *Tetramolopium* and transferred all Hawaiian *Vittadinia* to that genus (Hillebrand 1888). Drake del Castillo (1888) placed this species in the

closely related genus *Erigeron*; he gave no explanation for his action, and this course has not been followed by other botanists.

Tetramolopium remyi, a member of the sunflower family (Asteraceae), is a much branched, decumbent (reclining, with the end ascending) or occasionally erect shrub up to about 15 in (40 cm) tall. Its leaves are firm, very narrow, 0.6 to 1.4 in (1.5 to 3.5 cm) long, and with the edges rolled inward when the leaf is mature. There is a single flower head per branch. The heads are 0.4 to 0.6 in (0.9 to 1.5 cm) in diameter and on stalks 1.6 to 4.7 in (4 to 12 cm) tall; each comprises 70 to 100 yellow disk and 150 to 250 white ray florets. 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 1 flower head per branch (Lowrey 1986, 1990; Sherff 1935a).

A single population of *Tetramolopium remyi*, comprising about 35 plants growing in an area of about 2,500 sq ft (230 sq m), is known to be extant; the population is found on Aualua Ridge at an elevation of about 750 ft (228 m). From the time the population was first observed about 11 years ago, it has decreased slightly. However, fluctuations in population size are normal, depending on season and rainfall (R. Hobdy, pers. comm., 1990). Historically, the species also was known from the Lahaina area of West Maui. As it has not been documented from Maui since 1944, it is believed to be extinct on that island. Browsing by deer and mouflon sheep (*Ovis musimon*) and competition from invading weedy species, primarily broomsedge (*Andropogon virginicus*) and Guinea grass (*Panicum maximum*), are the main threats to the species (HPCC 1990b; R. Hobdy, pers. comm., 1990). The plants are tiny and can easily be displaced and eliminated by invading exotic species. Because the population grows on a dry part of the island, fires also are a potential threat (HPCC 1990b).

Viola lanaiensis was first collected by Remy on Lanai sometime between 1851 and 1855. Hillebrand (1888) mentioned in passing that Remy's specimen probably was *V. robusta*, but it was not until 1911 that it was critically studied. In that year, Joseph Rock described the Lanai plant as a variety of *Viola helenae*, a species restricted to the Wahiawa drainage basin of Kauai (Rock 1911). Independently, and without knowledge

of Rock's publication, Wilhelm Becker described the taxon, named it *V. lanaiensis*, and selected a specimen collected by Rock as the type (Becker 1916). The similarity between the Lanai plant and *V. helenae* is superficial, and most botanists today regard the Lanai *Viola* as a distinct species (Becker 1916; St. John 1979, 1989; Wagner *et al.* 1990).

Viola lanaiensis is a member of the violet family (Violaceae) and is a small, erect, unbranched or little branched subshrub, 4 to 16 in (10 to 40 cm) tall. The leaves, which are clustered toward the upper part of the stem, are lance-shaped, about 2.4 to 4.3 in (6 to 11 cm) long and 0.5 to 1.0 in (1.3 to 2.5 cm) wide. Below each leaf is a pair of narrow, membranous stipules, about 0.4 in (0.9 cm) long. The flowers are small, 0.4 to 0.6 in (1.0 to 1.5 cm) long, white tinged with purple or with purple veins, occurring singly or up to four per upper leaf axil. The fruit are capsules, about 0.4 to 0.5 in (1.0 to 1.3 cm) long. It is the only member of the genus on Lanai (Becker 1916, MacCaughy 1918, St. John 1989, Skottsberg 1940, Wagner *et al.* 1990).

Viola lanaiensis historically was known from the summit and upper slopes of Lanaihale from near the head of Hookio Gulch to Haalelepaakai, a distance of about 2.5 mi (4 km). Presently, two small populations exist. Although their size currently is unknown, it is estimated that the two populations total less than 500 plants (J. Lau, pers. comm., 1990). This estimate undoubtedly is very high (Derrall Herbst, pers. obs.). Threats include browsing by deer and competition from invading exotic plants (J. Lau, pers. comm., 1990, St. John 1981), and the potential of extinction from stochastic events due to the small population size and restricted distribution. As most of the plants grow along the Lanaihale trails, the threat of destruction or damage to the plants will increase as the tourist industry continues to develop the island.

Previous Federal Action

Federal action on these plants began as a result of section 12 of the Act, 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, *Gahnia lanaiensis* and *Viola lanaiensis* (as *V. helenae* var. *lanaiensis*) were considered to be endangered; *Abutilon eremitopetalum*, *Cyanea macrostegia* subsp. *gibsonii* (as *C. gibsonii*), *Phyllostegia glabra* var. *lanaiensis*, and

Tetramolopium remyi were considered to be extinct. On July 1, 1975, the Service published a notice in the Federal Register (40 FR 27823) of its 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 giving notice of its intention to review the status of the plant taxa named therein. As a result of that review, on June 16, 1976, the Service 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 species, including *Abutilon eremitopetalum*, *Cyanea macrostegia* subsp. *gibsonii* (as *C. gibsonii*), *Gahnia lanaiensis*, *Phyllostegia glabra* var. *lanaiensis*, *Tetramolopium remyi*, and *Viola lanaiensis* (as *V. helenae* var. *lanaiensis*). 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.

General comments received in relation to the 1976 proposal are summarized in an April 26, 1978, Federal Register publication (43 FR 17909). In 1978, amendments to the Act required that all proposals over 2 years old be withdrawn. A 1-year grace period was given to proposals already over 2 years old. On December 10, 1979, the Service 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.

The Service published updated notices of review for plants on December 15, 1980 (45 FR 82479), September 27, 1985 (50 FR 39525), and February 21, 1990 (55 FR 6183). In these notices, *Abutilon eremitopetalum*, *Cyanea macrostegia* subsp. *gibsonii* (as *C. gibsonii*) in the 1980 and 1985 notices of review, *Gahnia lanaiensis*, *Phyllostegia glabra* var. *lanaiensis*, *Tetramolopium remyi*, and *Viola lanaiensis* (as *V. helenae* in the 1980 and 1985 notices of review) were treated as Category 1 candidates for Federal listing. Category 1 taxa are those for which the Service has on file substantial information on biological vulnerability and threats to support preparation of listing proposals.

Section 4(b)(3)(B) of the Act requires the Secretary to make findings on certain pending petitions within 12 months of their receipt. Section 2(b)(1) of the 1982 amendments further requires that all petitions pending on October 13, 1982, be treated as having been newly

submitted on that date. On October 13, 1983, the Service found that the petitioned listing of these species was warranted, but precluded by other pending listing actions, in accordance with section 4(b)(3)(B)(iii) of the Act; notification of this finding was published on January 20, 1984 (49 FR 2485). Such a finding requires the petition to be recycled, pursuant to section 4(b)(3)(C)(i) of the Act. The finding was reviewed in October of 1984, 1985, 1986, 1987, 1988, and 1989. On September 17, 1990, the Service published in the *Federal Register* (55 FR 38236) a proposal to list these six taxa as endangered. This proposal was based primarily on information supplied by the Hawaii Heritage Program, data from specimens in the Herbarium Pacificum of the Bernice P. Bishop Museum, and the observations of botanists and naturalists. The Service now determines *Abutilon eremitopetalum*, *Cyanea macrostegia* subsp. *gibsonii*, *Gahnia lanaiensis*, *Phyllostegia glabra* var. *lanaiensis*, *Tetramolopium remyi*, and *Viola lanaiensis* to be endangered species with the publication of this rule.

Summary of Comments and Recommendations

In the September 17, 1990, proposed rule and associated notifications, all interested parties were requested to submit factual reports or information that might contribute to the final listing decision. The public comment period ended on November 16, 1990. Appropriate State agencies, county and city governments, Federal agencies, scientific organizations, and other interested parties were contacted and requested to comment. A newspaper notice was published in the "Maui News" on September 28, 1990, which invited general public comment. No public hearing was requested or held. Three letters of comment were received. Two conservation organizations responded to our request for comments: The Hawaii Heritage Program of The Nature Conservancy compared the status information in the proposed rule and found it consistent with the information for the six taxa that they had in their files; the Center for Plant Conservation supported the listing of the taxa. The third response was from Castle and Cooke, Inc. (C&C), which owns approximately 98 percent of the island of Lanai. They did not support the listing of the six taxa. Their comments and the Service's response to each are given below.

Issue 1: C&C questioned the observed rarity of the taxa in the proposed rule. In their view, neither the distributions nor the populations of the six plants are

fully known at the present time, but the distributions are likely to be greater than stated in the proposal, and therefore the plants would not qualify for endangered status. Also, given our lack of knowledge of the population size and distribution of the six taxa, the threat of destruction from stochastic events is highly speculative. Their rationale for this statement was as follows:

First: Lanaihale comprises an area of about 9,000 acres (3,642 hectares); its gulches and valleys are rugged and steep walled and have not been explored with any frequency or regularity.

Second: With the exception of *Abutilon eremitopetalum*, the known individuals of the taxa in the proposed rule are found in the vicinity of the existing trails on Lanaihale. C&C believes that no recent, thorough surveys have been conducted throughout the historic ranges of the taxa or other parts of Lanaihale where these plants potentially could be found. Therefore C&C believes it very likely that additional occurrences of each taxon exist on Lanaihale and that the proposed rule has significantly underestimated the abundance and distribution of these taxa. The Hawaii Heritage Program, one of the major sources of information in the proposed rule, states that its data base does not provide a definitive or comprehensive statement on the distribution and abundance of species.

Third: The information in the proposed rule concerning the six plants apparently came from personal communications from very few individuals or from the Hawaii Heritage Program data base. With the exception of *Gahnia lanaiensis*, the information in the proposal is based upon the personal observations of Robert Hobdy which, C&C believes, were made during field surveys on Lanai between August 16 and September 2, 1987. During this short period of time, Hobdy made several significant discoveries, which would indicate that the data used by the Service in proposing these plants as endangered is too limited to make an informed decision concerning their populations and distributions.

Service Response: First: More data on the population size and distribution of these plants would have been desirable, but is unnecessary to demonstrate the present-day rarity of the taxa. Given the threats to these plants, the amount of sampling which has occurred on the island (see "Third" below), and the noted decline in the quality of the habitat over the years, it is unlikely that

a sufficiently large and widespread, yet undiscovered population exists to warrant removal of the taxa from consideration for listing as endangered.

Second: The proposed rule mentions only two plants, *Gahnia lanaiensis* and *Viola lanaiensis*, with populations in the vicinity of the existing trails on Lanaihale; the distributions given for the other four plants are ridges and walls and floors of valleys. As discussed in the preceding response, the Service believes that the available information on these taxa is sufficient to warrant listing them as endangered. Section 4(b)(1)(A) of the Act states that the Secretary of the Interior shall make a determination whether any species is an endangered species or a threatened species solely on the basis of the best scientific data available. Therefore the Hawaii Heritage Program's statement that its data base may not have the final word on taxa in no way removes these plants from consideration as endangered or threatened taxa. The Act also requires that the Service periodically review all taxa listed by the Federal government as endangered or threatened. The discovery of additional populations could lead to the downlisting or delisting of the taxa.

Third: Knowledge of the flora of the island of Lanai began with the collections of Ezechiele Jules Remy, made between 1851 and 1855. By 1920, at least eight other botanists had collected on the island. Beginning in 1927, George C. Munro, a resident of Lanai and manager of the cattle ranch on the island, took an active interest in the flora of the island, and for the next 12 years sent specimens of the island's plants to the Bishop Museum. He freely shared his knowledge of the island's flora with other interested parties such as Dr. F. R. Fosberg, who spent a week botanizing on the island with him in 1935. Since that time a great number of botanists and naturalists have collected and studied the plants of Lanai. Perhaps the longest stay by a non-resident interested in Lanai's flora was that of Drs. Otto and Isa Degener, who spent three months on the island in late 1963 and early 1964. It was during their visit that Robert Hobdy became interested in the flora of the island. Mr. Hobdy is now recognized as the authority on the flora of Lanai and has continued up to the present to study the island's plants; his information is the most current. As Hobdy is an authority on the plants of Lanai, and as his information is the most current (he has conducted surveys since that of 1987), his observations were cited most frequently in the proposed rule. However, all available information

on the island's plants (including the results of Munro, Fosberg, and the Degeners) was taken into account while drafting the proposed rule.

Issue 2: The proposed tourist industry does not present a threat to the plants. None of the development will take place on Lanaihale, a mostly rugged, not easily accessible area, and use of Lanaihale will be controlled by C&C.

Service Response: The proposed rule acknowledges that no development presently planned for the island will directly impact the six plants included in the proposal. However, the Service stands by its statement that the plants face a *potential* threat of damage to their habitat due to increased human traffic stemming from recreational use and development-related activities. The first four phases of development planned for the island include 352 hotel rooms, 500 single family homes, and about 200 townhouses. Compared with the pre-development numbers, this will almost double the number of residential units and will be an increase of 342 hotel units (State of Hawaii 1980). It is unknown what further development will occur if the first four phases are successful. Many of the valley of Lanaihale are rugged and not easily accessible, but the Munro Trail, which traverses Lanaihale, is a good jeep road and is easily hiked. Two of the plants included in the proposed rule occur along the trail and are susceptible to inadvertent damage by those using the trail. Regardless of the numerous amenities provided downslope by C&C, many people enjoy hiking or traveling by jeep in more remote areas and it is very likely that the use of Lanaihale by unguided individuals will increase with the influx of people attracted by the development of the island.

Issue 3: Fire does not pose a significant threat to the plants, as Lanaihale is damp most of the year.

Service Response: Fire is listed as a threat to two of the plants, *Tetramolopium remyi* and *Abutilon eremitopetalum*. These species grow on lower elevation, dry ridges where fires do occur on occasion.

Issue 4: Any threat from axis deer is likely to be reduced in the future. Because deer have damaged vegetation on the island and pose a risk to Lanai's watershed on Lanaihale, C&C is undertaking measures to control and reduce the deer population.

Service Response: The Act requires that the Service periodically review the status of all taxa listed by the Federal government as endangered or threatened. A change in status could lead to the downlisting or delisting of the taxa. Should the population of axis

deer be reduced to the point that it no longer poses a threat to one or more of these plants, then the status of those taxa will be reassessed and they would be downlisted or delisted if warranted.

Issue 5: Habitat degradation and competition by naturalized, exotic vegetation does not pose a significant threat. The proposed rule mentions that only three of the plants, *Phyllostegia glabra* var. *lanaiensis*, *Tetramolopium remyi*, and *Viola lanaiensis*, were threatened by competing, naturalized vegetation. *Phyllostegia glabra* var. *lanaiensis* has not been seen for several years, but is likely to still exist, according to the proposed rule. The *Tetramolopium remyi* population has decreased only slightly in the last 11 years. This seems to belie the proposed rule's contention that these plants can easily be eliminated by invading, exotic species.

Service Response: The proposed rule states that *Abutilon eremitopetalum* is threatened by encroaching exotic plants such as lantana, koa haole, and sourbush; *Cyanea macrostegia* subsp. *gibsonii* by kahili ginger; *Gahnia lanaiensis* potentially by manuka, which is spreading along Lanaihale; *Tetramolopium remyi* by broomsedge and Guinea grass; and *Viola lanaiensis* by various invading, exotic plants. Although *Phyllostegia glabra* var. *lanaiensis* has not been seen since the 1980's, the proposed rule states that exotic plants are a threat to all native vegetation within its historic range. That aggressive, exotic vegetation can and does compete with and often replaces native vegetation is well documented for many parts of the world, including Hawaii. The dry land species in the proposed rule, such as *Tetramolopium remyi*, are doubly threatened by the presence of grasses. Grasses provide fuel for fires, and a fire usually will favor the more rapid spread of the grasses; also very few species can outcompete well established, perennial grasses such as those that threaten *Tetramolopium remyi*. A single fire or a year of weather favorable to the grasses could mark the end of the population of *Tetramolopium remyi*. The fact that this species appears to have maintained its population over the past 11 years does not discount the threat that exotic vegetation poses to its survival.

Summary of Factors Affecting the Species

After a thorough review and consideration of all information available, the Service has determined that the six taxa from Lanai in this rule should be classified as endangered species. Procedures found at section 4 of

the Endangered Species Act (16 U.S.C. 1533) and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act were followed. A species may be determined to be endangered or threatened species due to one or more of the five factors described in section 4(a)(1). These factors and their application to *Abutilon eremitopetalum* Caum (NCN), *Cyanea macrostegia* subsp. *gibsonii* (Hillebr.) Lammers (NCN), *Gahnia lanaiensis* Degener, I. Degener, and J. Kern (NCN), *Phyllostegia glabra* var. *lanaiensis* Sheriff (NCN), *Tetramolopium remyi* (A. Gray) Hillebr. (NCN), and *Viola lanaiensis* W. Becker (NCN) are as follows:

A. The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

As evidenced by remnants of native vegetation on this island, Lanai probably was covered throughout by forests and shrublands before arrival of the early Polynesians who discovered the islands. Much of Lanai's vegetation was destroyed by early land use practices, which include cattle and sheep (*Ovis aries*) ranching; the clearing of land for pineapple cultivation; and the introduction of feral animals such as goats (*Capra hircus*), deer, and mouflon sheep, and domestic animals such as cattle and pigs (*Sus scrofa*) which later became feral (Cuddihy and Stone 1990, Fosberg 1936b, Tomich 1986). Over the ensuing years, the cattle, sheep, goats, and pigs were destroyed or removed from the island. But it is estimated that only about 10 percent of the island presently remains in native forest or shrubland (Alan Holt, the Nature Conservancy of Hawaii, pers. comm., 1990). Today, habitat degradation due to axis deer, and, to a lesser extent, mouflon, and the invasion of and competition by exotic species of plants probably are the two greatest threats to the six taxa in this rule. The axis deer is now considered to be the major threat to the forests of Lanai (Culliney 1988). Deer and mouflon browse on native vegetation (see Factor C), destroying or damaging the habitat. Also, their trampling removes vegetation and litter important to soil-water relations, compacts the soil, promotes erosion, and opens areas, allowing exotic plants to invade. Deer are common throughout the summit; very few patches of forest are untouched by them. Ridge tops in particular, are being invaded, but so are gulches (R. Hobdy, pers. comm., 1990).

Lanai is in the process of converting from an agricultural (pineapple) to a tourist-based economy. Hotels are being

built in conjunction with an anticipated increase in the tourist industry. Although at present there are no plans for development which would directly impact Lanaihale, it is inevitable that an increase in the number of people on the island will have that effect. The Munro Trail, which traverses Lanaihale, affords a beautiful view of the island and will likely be popular with tourists.

Approximately 30 percent of the known plants of *Gahnia lanaiensis* and most of the known *Viola lanaiensis* plants grow along this trail or one of its branches. Increased hiking or jeep-riding along the trail could lead to the destruction of individuals of these plants. Disturbance of the soil or destruction of groundcover plants due to these activities would increase the potential for erosion and open the area to invading exotic plants.

B. Overutilization for commercial, recreational, scientific, or educational purposes

Illegal collecting for scientific or horticultural purposes or excessive visits by individuals interested in seeing rare plants could result from increased publicity and would seriously impact the taxa in this rule. Disturbance to the area by trampling during recreational use (hiking, for example) would promote erosion and greater ingress by competing exotic species. This threat will increase as the tourist industry becomes a more prominent force on Lanai.

C. Disease or Predation

Axis deer and mouflon sheep are managed by the State for recreational hunting on the island. The deer are primarily on the summit and in the gulches of Lanaihale, whereas mouflon are more common on the drier slopes—precisely the habitats of the six taxa included in this rule. In addition to habitat degradation resulting from their activities, which was discussed in Factor A above, their browsing also destroys or damages plants.

D. The Inadequacy of Existing Regulatory Mechanisms

There are no State laws or existing regulatory mechanisms at the present time to protect these taxa or to prevent their further decline. However, Hawaii's Endangered Species Act (Hawaii Revised Statutes (HRS), section 195D-4(a)) states, "Any species of aquatic life, wildlife or land plant that has been determined to be an endangered species pursuant to the Endangered Species Act (of 1973) shall be deemed to be an endangered species under the provisions of this chapter * * *". Further, the State may enter into agreements with Federal

agencies to administer and manage any area required for the conservation, management, enhancement, or protection of endangered species (section 195D-5(c)). Funds for these activities could be made available under section 6 of the Federal Act (State Cooperative Agreements). Listing of the six taxa from Lanai will therefore reinforce and supplement the protection available to the taxa under State law. The Federal Act also will offer additional protection to the taxa, because it is a violation of the Act for any person to remove, cut, dig up, damage, or destroy an endangered plant in an area not under Federal jurisdiction in knowing violation of State law or regulation or in the course of any violation of a State criminal trespass law.

E. Other Natural or Manmade Factors Affecting its Continued Existence

The small number of populations and of individual plants of these taxa increases the potential for extinction from stochastic events. The limited gene pool may depress reproductive vigor, or a single man-caused or natural environmental disturbance could destroy a significant percentage of the individuals of these taxa.

Several species of exotic plants have become common on the summit and in the gulches and valleys of Lanaihale. Strawberry guava (*Psidium cattleianum*) is most common on the northern end of Lanaihale, firebush (*Myrica faya*) is most common on the southern end, and manuka has spread through the range (R. Hobdy, pers. comm., 1990). Kahili ginger is common on some of the valley floors, as in Kaiholena Gulch, while koa haole, lantana, and sourbush also are aggressive invaders. These weedy plants are more aggressive than the native species and compete more successfully for water, minerals, space, and light. In the drier areas, broomsedge and Guinea grass are the dominant exotic species (R. Hobdy, pers. comm., 1990). Not only do these species compete with native plants such as *Tetramolopium remyi*, they are a source of fuel, increasing the potential threat of fire in the area (HPCC 1990b).

The Service has carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by these taxa in determining to make this rule final. Based on this evaluation, the preferred action is to list *Abutilon eremitopetalum*, *Cyanea macrostegia* subsp. *gibsonii*, *Gahnia lanaiensis*, *Phyllostegia glabra* var. *lanaiensis*, *Tetramolopium remyi*, and *Viola lanaiensis* as endangered. These taxa

are threatened by predation and habitat degradation by feral animals, by encroachment and competition from exotic species of plants, and/or by the potential of stochastic events to extirpate these small populations with restricted distributions. They also face the potential threat of damage to their habitat by increased human traffic stemming from recreational use and development-related activities. In addition, wildfires can eliminate plants and habitat. Because these taxa are in danger of extinction throughout all or a significant portion of their range, they fit the definition of endangered as defined in the Act. Critical habitat is not being designated for these taxa for reasons discussed in the "Critical Habitat" section of this rule.

Critical Habitat

Section 4(a)(3) of the Act, as amended, requires that to the maximum extent prudent and determinable, the Secretary designate critical habitat concurrently with determining a species to be endangered or threatened. The Service finds that designation of critical habitat is not presently prudent for these taxa. Such a determination would result in no known benefit to the taxa. The publication of descriptions and maps required when critical habitat is designated would increase the degree of threat to these plants from possible take or vandalism and, therefore, could contribute to their decline and increase enforcement problems. The listing of these taxa as endangered publicizes the rarity of the plants and, thus, can make them attractive to researchers, curiosity seekers, or collectors of rare plants. All involved parties and the major landowner have been notified of the general location and importance of protecting the habitat of these taxa. Protection of their habitat will be addressed through the recovery process and through the section 7 consultation process. Therefore, the Service finds that designation of critical habitat for these taxa is not prudent at this time, because such designation would increase the degree of threat from vandalism, collecting, or other human activities, and because it is unlikely to aid in the conservation of these taxa.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Endangered Species Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain activities. Recognition through listing encourages and results in

conservation actions by Federal, State, and private agencies, groups, and individuals. The Endangered Species Act provides for possible land acquisition and cooperation with the State and requires that recovery actions be carried out for all listed species. The protection required of Federal agencies and the prohibitions against certain activities involving listed plants are discussed, in part, below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if any is being designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with the Service. Although none of these taxa occur on Federal land, private activities requiring Federal permits or funding can be affected. In this case, the Federal agency is responsible for consulting with the Service under section 7 of the Act to ensure that the activities they provide permits or funding for are not likely to jeopardize the continued existence of any listed species.

The Act and its implementing regulations found at 50 CFR 17.61, 17.62, and 17.63 set forth a series of general trade prohibitions and exceptions that apply to all endangered plants. With respect to the six plants from the island of Lanai, all trade prohibitions of section 9(a)(2) of the Act, implemented by 50 CFR 17.61, apply. These prohibitions, in part, make it illegal with respect to any endangered plant for any person subject to the jurisdiction of the United States to import or export; transport in interstate or foreign commerce in the course of a commercial activity; sell or offer for sale these species in interstate or foreign commerce; remove and reduce to possession any such species from areas under Federal jurisdiction; maliciously damage or destroy any such plants on any area under Federal jurisdiction; or remove, cut, dig up, damage, or destroy listed plants on any other area in knowing violation of any State law or regulation or in the course of any violation of a State criminal trespass law. Certain exceptions apply to agents of the Service and State conservation

agencies. The Act and 50 CFR 17.62 and 17.63 also provide for the issuance of permits to carry out otherwise prohibited activities involving endangered plant species under certain circumstances.

It is anticipated that few, if any, trade permits would ever be sought or issued because the taxa are not common in cultivation or in the wild. Requests for copies of the regulations on plants and inquiries regarding them may be addressed to the Office of Management Authority, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, room 432-ARLSQ, Arlington, Virginia 22203-3507 (703/358-2104, FTS 921-2093).

National Environmental Policy Act

The Fish and Wildlife Service has determined that an Environmental Assessment, as defined under the authority of the National Environmental Policy Act of 1969, need not be prepared in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act of 1973, as amended. A notice outlining the Service's reasons for this determination was published in the **Federal Register** on October 25, 1983 (48 FR 49244).

References Cited

- Bates, D.M. 1990. Malvaceae: Pp. 868-903 in Wagner, W.L., D.R. Herbst, and S.H. Sohmer, Manual of the flowering plants of Hawai'i. Bishop Mus. Spec. Publ. 83. University of Hawaii Press and Bishop Museum Press, Honolulu.
- Becker, W. 1916. *Viola asiatica* et *Australensis*. I. Beih. Bot. Centralbl. 34: 208-266.
- Caum, E.L. 1933. *Abutilon cryptopetalum*. In: Degener, O. Fl. Hawaiiensis, fam. 221. Malvaceae. Publ. priv., 2 pp.
- Christophersen, E. 1934. A new Hawaiian *Abutilon*. Occas. Pap. Bernice P. Bishop Mus. 10(15): 1-7.
- Cuddihy, L.W., and C.P. Stone. 1990. Alteration of native Hawaiian vegetation: effects of humans, their activities and introductions. University of Hawaii Cooperative National Park Resources Studies Unit, Honolulu. 138 pp.
- Culliney, J.L. 1988. Islands in a far sea; nature and man in Hawaii. Sierra Club Books, San Francisco. 410 pp.
- Degener, O. 1932. Fl. Hawaiiensis, fam. 221. *Abortopetalum*. Publ. priv., 2 pp. Rep., 1946.
- Degener, O. 1936. Fl. Hawaiiensis, contents of second century and important notes. Publ. Priv., 4 pp. Rep., 1946.
- Degener, O., and I. Degener. 1960. Fl. Hawaiiensis, fam. 316. Labiatae; *Phyllostegia glabra*, part 2. Publ. priv., 2 pp.
- Degener, O., and I. Degener. 1965. Fl. Hawaiiensis, fam. 48. Cyperaceae; *Gahnia lanaiensis*. Publ. priv., 2 pp.
- Degener, O., I. Degener, and J.H. Kern. 1964. A new Hawaiian *Gahnia* (Cyperaceae). Blumea 12: 349-351.
- Drake del Castillo, E. 1888. Illustrationes florae insularum maris pacifici. Part 4. G. Masson, Paris, pp. 65-80 (Facsimile ed., 1977, J. Cramer, Vaduz).
- Ekern, P.C. 1964. Direct interception of cloud water on Lanaihale, Hawaii. Soil Sci. Soc. Proc. 28: 419-421.
- Foote, D.E., E.L. Hill, S. Nakamura, and F. Stephens. 1972. Soil survey of the islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. U.S. Dept. of Agriculture Soil Conservation Service, Washington, D.C. 232 pp., 130 maps.
- Fosberg, F.R. 1936a. Miscellaneous Hawaiian plant notes—I. Occas. Pap. Bernice P. Bishop Mus. 12(15): 1-11.
- Fosberg, F.R. 1936b. Plant collecting on Lanai, 1935. Mid-Pacific Mag. 49: 119-123.
- Gagne, W.C., and L.W. Cuddihy. 1990. Vegetation. Pp. 45-114 in Wagner, W.L., D.R. Herbst, and S.H. Sohmer, Manual of the flowering plants of Hawai'i. Bishop Mus. Spec. Publ. 83. University of Hawaii Press and Bishop Museum Press, Honolulu.
- Gray, A. 1861. Characters of some Compositae in the collection of the United States South Pacific Exploring Expedition under Captain Wilkes, with observations &c. Proc. Amer. Acad. Arts 5: 114-146.
- Hawaii Heritage Program. 1990a. Element Occurrence Record for *Abutilon eremitopetalum*, PDMAL02030.001, dated March 4, 1989. Honolulu. Unpubl. 2 pp.
- Hawaii Heritage Program. 1990b. Element Occurrence Record for *Abutilon eremitopetalum*, PDMAL02030.002, dated May 2, 1990. Honolulu. Unpubl. 2 pp.
- Hawaii Heritage Program. 1990c. Element Occurrence Record for *Abutilon eremitopetalum*, PDMAL02030.008, dated May 2, 1990. Honolulu. Unpubl. 2 pp.
- Hawaii Heritage Program. 1990d. Element Occurrence Record for *Gahnia lanaiensis*, PMCYP0D040.001, dated March 24, 1990. Honolulu. Unpubl. 2pp.
- Hawaii Heritage Program. 1990e. Element Occurrence Record for *Gahnia lanaiensis*, PMCYP0D040.002, dated March 24, 1990. Honolulu. Unpubl. 2 pp.
- Hawaii Heritage Program. 1990f. Element Occurrence Record for *Gahnia lanaiensis*, PMCYP0D040.003, dated March 24, 1990. Honolulu. Unpubl. 1 p.
- Hawaii Plant Conservation Center. 1990a. Hawaii Plant Conservation Center Accession Data for *Abutilon eremitopetalum*, 905216.000, Lawai, Kauai. Unpubl. 1 p.
- Hawaii Plant Conservation Center. 1990b. Hawaii Plant Conservation Center Accession Data for *Tetramolopium remyi*, 905214.000, Lawai, Kauai. Unpubl. 1 p.
- Hillebrand, W. 1888. Flora of the Hawaiian Islands: a description of their phanerogams and vascular cryptogams. Carl Winter, Heidelberg, Germany. 673 pp.
- Koyama, T. 1990. Cyperaceae. Pp. 1381-1436 in Wagner, W.L., D.R. Herbst, and S.H. Sohmer. Manual of the flowering plants of Hawai'i. Bishop Mus. Spec. Publ. 83. University of Hawaii Press and Bishop Museum Press, Honolulu.
- Lammers, T.G. 1988. New taxa, new names, and new combinations in the Hawaiian Lobelioideae (Campanulaceae). Systematic Botany 13(4): 496-508.

Lammers, T.G. 1990. Campanulaceae. Pp. 420-489 in Wagner, W.L., D.R. Herbst, and S.H. Sohmer. Manual of the Flowering plants of Hawai'i. Bishop Mus. Spec. Publ. 83. University of Hawaii Press and Bishop Museum Press, Honolulu.

Lowrey, T.K. 1986. A biosystematic revision of Hawaiian *Tetramolopium* (Compositae: Astereae). Allertonia 4: 203-265.

Lowrey, T.K. 1990. *Tetramolopium*. Pp. 361-369 in Wagner, W.L., D.R. Herbst, and S.H. Sohmer. Manual of the flowering plants of Hawai'i. Bishop Mus. Spec. Publ. 83. University of Hawaii Press and Bishop Museum Press, Honolulu.

MacCaughy, V. 1918. The Hawaiian Violaceae. Torreyia 18: 1-11.

Rock, J.F. 1911. Notes upon Hawaiian plants with descriptions of new species and varieties. Coll. Hawaii Publ. Bull. 1: 1-20.

Rock, J.F. 1919. A monographic study of the Hawaiian species of the tribe *Lobelioideae*, family Campanulaceae. Mem. Bernice P. Bishop Mus. 7(2): 1-395.

St. John, H. 1979. Resurrection of *Viola helenae* Becker. Hawaiian plant studies 90. Phytologia 44: 323-324.

St. John, H. (C.A. Corn, ed.). 1981. Rare endemic plants of the Hawaiian Islands. Hawaii Dept. of Land and Nat. Resources, Honolulu. 74 pp.

St. John, H. 1987. Enlargement of *Delissea* (Lobeliaceae). Hawaiian plant studies 138. Phytologia 63: 79-90.

St. John, H. 1989. Revision of the Hawaiian species of *Viola* (Violaceae). Bot. Jahrb. Syst. 111(2): 165-204.

St. John, H., and W. Takeuchi. 1987. Are the distinctions of *Delissea* valid? Hawaiian plant studies 137. Phytologia 63: 129-130.

Sherff, E.E. 1934. Some new or otherwise noteworthy members of the families Labiatae and Compositae. Bot. Gaz. (Crawfordsville) 96: 136-153.

Sherff, E.E. 1935a. Revision of *Tetramolopium*, *Lipochaeta*, *Duboutia*, and *Raillardia*. Bernice P. Bishop Mus. Bull. 135: 1-136.

Sherff, E.E. 1935b. Revision of *Haplostachys*, *Phyllostegia*, and *Stenogyne*. Bernice P. Bishop Mus. Bull. 136: 1-101.

Skottsberg, C. 1940. Observations on Hawaiian violets. Acta Horti Gothob. 13: 451-528.

State of Hawaii. 1980. State of Hawaii data book, a statistical abstract. Hawaii Dept. of Planning and Economic Development, Honolulu. 545 pp.

Tomich, P.Q. 1986. Mammals in Hawaii. 2nd ed. Bishop Mus. Spec. Publ. 76. Bishop Museum Press, Honolulu. 375 pp.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawai'i. Bishop Mus. Spec. Publ. 83. University of Hawaii Press and Bishop Museum Press, Honolulu. 1853 pp.

Wimmer, F.E. 1943. Campanulaceae-Lobelioideae. I. Pflanzenz. IV. 276b (Heft 106): 1-260.

Author

The primary author of this final rule is Dr. Derral R. Herbst, Fish and Wildlife Enhancement, Pacific Islands Office,

U.S. Fish and Wildlife Service, 300 Ala Moana Boulevard, room 6307, P.O. Box 50167, Honolulu, Hawaii 96850 (808/541-2749 or FTS 551-2749).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Regulations Promulgation

PART 17—[AMENDED]

Accordingly, part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, is amended as set forth below:

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361-1407, 16 U.S.C. 1531-1544; 16 U.S.C. 4201-4245; Pub. L. 99-625, 100 Stat. 3500, unless otherwise noted.

2. Amend § 17.12(h) by adding the following, in alphabetical order under the families indicated, to the List of Endangered and Threatened Plants:

§ 17.12 Endangered and threatened plants.

* * * * *
(h) * * *

Species		Historic range	Status	When listed	Critical habitat	Special rules
Scientific name	Common name					
Asteraceae—Aster family:						
<i>Tetramolopium remyi</i>	None.....	U.S.A. (HI).....	E	435	NA	NA
Campanulaceae—Bellflower family:						
<i>Cyanea macrostegia</i> subsp. <i>gibsonii</i>	None.....	U.S.A. (HI).....	E	435	NA	NA
Cyperaceae—Sedge family:						
<i>Gahnia lanaiensis</i>	None.....	U.S.A. (HI).....	E	435	NA	NA
Lamiaceae—Mint family:						
<i>Phyllostegia glabra</i> var. <i>lanaiensis</i>	None.....	U.S.A. (HI).....	E	435	NA	NA
Malvaceae—Mallow family:						
<i>Abutilon eremitopetalum</i>	None.....	U.S.A. (HI).....	E	435	NA	NA
Violaceae—Violet family:						
<i>Viola lanaiensis</i>	None.....	U.S.A. (HI).....	E	435	NA	NA

Dated: August 27, 1991.

Richard N. Smith,

Acting Director, Fish and Wildlife Service.

[FR Doc. 91-22693 Filed 9-19-91; 8:45am]

BILLING CODE 4310-55-M
