U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Cyanea kuhihewa*

COMMON NAME: Haha

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: June 2004

STATUS/ACTION:
___ Initial 12-month Petition Finding: ___ not warranted
___ warranted
___ warranted but precluded (also complete (c) and (d) in section on petitioned candidate species- why action is precluded)
____ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status
___ New candidate
_X__ Continuing candidate
___ Non-petitioned
_X__ Petitioned - Date petition received: May 11, 2004
__ 90-day positive - FR date: _____
__ 12-month warranted but precluded - FR date: _____
_N_ Is the petition requesting a reclassification of a listed species?
___ Listing priority change
Former LP: ___
New LP: ___
Latest Date species became a Candidate: 1997
___ Candidate removal: Former LP: __
___ A - Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
___ F - Range is no longer a U.S. territory.
___ I - Insufficient information exists on biological vulnerability and threats to support listing.
___ M - Taxon mistakenly included in past notice of review.
___ N - Taxon may not meet the Act's definition of "species."
___ X - Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Campanulaceae (Bellflower family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

LEAD REGION CONTACT: Scott McCarthy, 503-231-6237

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish & Wildlife Office, Christa Russell, 808-792-9451

BIOLOGICAL INFORMATION:

Species Description *Cyanea kuhihewa* is a shrub 0.4 to 2.3 meters (m) (1.2 to 7.4 feet (ft)) tall; with unbranched erect stems 0.4 to 0.5 centimeters (cm) (0.16 to 0.2 inches (in)) in diameter. Leaves are glabrous, 31 to 38 cm (12 to 15 in) long, 1.2 to 1.5 cm (0.5 to 0.6 in) wide, and slightly paler below. Inflorescences are ascending, 5 to 8-flowered, with a peduncle 10 to 16 millimeters (mm) (0.4 to 0.6 in) long and sparsely pubescent. Calyx lobes are triangular, 1.4 to 1.5 mm (0.06 in) long, and 0.9 to 1.1 mm (0.04 in) wide. The corolla is rose-purple with lobes edged in white, 47 to 53 mm (1.9 to 2.1 in) long, a curved tube 28 to 33 mm (1.9 to 2.1 in) long and 5.3 mm (0.2 in) at the base. Mature berries have not been observed. Seeds are ellipsoid, dark brown or black, 0.7 to 0.8 mm (0.03 in) long, and 0.3 to 0.4 mm (0.03 in) wide, smooth and shiny (Lammers 1996).

Taxonomy *Cyanea kuhihewa* was described by Lammers. This species is recognized as a distinct taxon in the supplement to the Manual of the Flowering Plants of Hawaii, 2003.

Habitat *Cyanea kuhihewa* is found in *Metrosideros polymorpha-Dicranopteris linearis* lowland wet forest with associated species such as *Antidesma platyphyllum*, *Athyrium microphyllum*, *Bidens* sp., *Bobea* sp., *Boehmeria grandis*, *Cibotium* sp., *Diplopterygium pinnatum*, *Eurya sandwicensis*, *Freycinetia arborea*, *Hedyotis acuminata*, *Isodendrion longifolium*, *Machaerina* sp., *Melicope feddei*, *Pisonia* sp., *Perrottetia sandwicensis*, *Psychotria* sp., *Sadleria* sp., *Tetraplasandra* sp., and *Wikstroemia* sp., at an elevation of 512 m (1,680 ft) (Lammers 1996; Ken Wood, National Tropical Botanical Garden, pers. comm. 1996; Hawaii Natural Heritage Program Database 2001).

Historical and Current Range/Current Status This newly discovered, recently published species was known from only one population totaling six individuals in Limahuli Valley on Kauai (Lammers 1996; Ken Wood, National Tropical Botanical Garden, pers. comm. 1996). In 2003 the last known individual in the wild died, but prior to that time, seeds were collected for genetic storage and the species is still found in cultivation (Ken Wood, pers. comm. 2004; Steve Perlman, National Tropical Botanical Garden, pers. comm. 2004).

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.
Pigs (*Sus scrofa*) are a threat to this species (Ken Wood, pers. comm., 1996). As early as 1778, European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. Past and present activities of introduced alien mammals are the primary factor altering and degrading vegetation and habitats on Kauai. Feral ungulates trample and eat native vegetation and disturb and open areas. This causes erosion and allows the entry of alien plant species (Cuddihy and Stone 1990; Wagner *et al*. 1999).

The pig is originally native to Europe, northern Africa, Asia Minor, and Asia. European pigs, introduced to Hawaii by Captain James Cook in 1778, became feral and invaded forested areas, especially wet and mesic forests and dry areas at high elevations. They are currently present on Kauai and four other islands, and inhabit rain forests and grasslands. Pig hunting is allowed on all islands either year-round or during certain months, depending on the area (Hawaii Department of Land and Natural Resources n.d.-a, n.d.-b, n.d.-c, 1990). While rooting in the ground in search of the invertebrates and plant material they eat, feral pigs disturb and destroy vegetative cover, trample plants and seedlings, and threaten forest regeneration by damaging seeds and seedlings. They disturb soil and cause erosion, especially on slopes. Alien plant seeds are dispersed on their hooves and coats as well as through their digestive tracts, and the disturbed soil is fertilized by their feces, helping these plants to establish. Pigs are a major vector in the spread of many introduced plant species (Cuddihy and Stone 1990; Medeiros *et al*. 1986; Scott *et al*. 1986; Smith 1985; Stone 1985; Tomich 1986; Wagner *et al*. 1999).

B. Overutilization for commercial, recreational, scientific, or educational purposes.
None known.

C. Disease or predation.
Rats and slugs are a major threat to members of the bellflower family in Hawaii, of which this species is a member (K. Wood, pers. comm. 1996). They will eat any portion of the plant, and have been documented completely removing all leaves from plants (Joel Lau, The Nature Conservancy, pers. comm. 1994; Loyal Mehrhoff, Service, pers. comm. 1994).

Of the four species of rodents that have been introduced to the Hawaiian Islands, the species with the greatest impact on the native flora and fauna is probably *Rattus rattus* (black or roof rat), that now occurs on all the main Hawaiian Islands and ranges into the wet forests. Black rats, and to a lesser extent *Mus musculus* (house mouse), *R. exulans* (Polynesian rat), and *R. norvegicus* (Norway rat), eat the fruits of some native plants, especially those with large, fleshy fruits. Many native Hawaiian plants produce fruit over an extended period of time, thus producing a prolonged food supply for rodent populations. Black rats strip bark from some native plants, and eat the fleshy stems and fruits of plants in the bellflower and African violet families (Cuddihy and Stone 1990; Tomich 1986; J. Lau, pers. comm. 1994). Rat damage to the stems of species of *Cyanea* has been reported in the wet forests of Kauai. On the island of Hawaii, a species in a closely related genus was completely defoliated by rats (Jack Jeffrey, U.S. Fish and Wildlife

Service, pers. comm. 1995). It is very likely that rats eat the fruits of this species (L. Mehrhoff, *in litt*. 1994; S. Perlman, pers. comm. 1994).

Little is known about the predation of certain rare Hawaiian plants by slugs. The effect of slugs on the decline of this and related species is unclear, although slugs may pose a threat by feeding on the stems and fruit, thereby, reducing the vigor of the plants and limiting regeneration (L. Mehrhoff, *in litt*. 1994; S. Perlman, pers. comm. 1994). Outplanted seedlings of the closely related genus *Clermontia* have been completed removed by slugs (Alvin Yoshinaga, University of Hawaii's Lyon Arboretm, pers. comm. 1995).

D. The inadequacy of existing regulatory mechanisms.
There is no current Federal or State protection for *Cyanea kuhihewa*.

E. Other natural or manmade factors affecting its continued existence.
Numerous weed species threaten *Cyanea kuhihewa* (K. Wood, pers. comm. 1996). The native vascular flora of Hawaii consists of about 1,500 species, 89 percent of which were endemic. An additional 1,500 species have been introduced and nearly 100 of these species have become pests (Smith 1985; Wagner *et al.* 1999). Pest species compete with native plants for space, light, water, and nutrients (Cuddihy and Stone 1990). Some of these species were brought to Hawaii by various groups of people, including the Polynesian immigrants, for food or cultural reasons. Plantation owners, alarmed at the reduction of water resources for their crops caused by the destruction of native forest cover by grazing feral animals, supported the introduction of alien tree species for reforestation. Ranchers intentionally introduced pasture grasses and other species for agriculture, and sometimes inadvertently introduced weed seeds as well. Other plants were brought to Hawaii for their potential horticultural value (Cuddihy and Stone 1990; Scott *et al*. 1986; Wenkam 1969). Many of these alien plant taxa are highly invasive, out-competing and displacing native plant taxa.

One of the weeds that is a serious threat to *Cyanea kuhihewa* is *Clidemia hirta* (Koster's curse) (K. Wood, pers. comm. 1996). Koster's curse, a noxious shrub native to tropical America, is found in mesic to wet forests on at least six islands in Hawaii (Almeda 1990; Hawaii Department of Agriculture 1981; Smith 1992). This noxious pest forms a dense understory, shading out other plants and hindering plant regeneration, and is considered the major alien plant threat (Cuddihy and Stone 1990).

SUMMARY OF REASONS FOR ADDITION, REMOVAL OR LISTING PRIORITY CHANGE:

___Is the removal based on a Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE) finding? If "Yes", summarize the specific PECE evaluation criteria that were met in determining that the conservation effort is sufficiently certain to be implemented and effective so as to have contributed to the elimination or adequate reduction of one or more threats to the species identified through the section 4(a)(1) analysis.

FOR PETITIONED CANDIDATE SPECIES (also complete c and d for initial 12-month petition findings):

a. Is listing warranted? Yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes

c. Is a proposal to list the species as threatened or endangered in preparation? No

d. If the answer to c. above is no, provide an explanation of why the action is precluded.

We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, almost our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, emergency listings, and essential litigation-related, administrative, and program management functions. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov/).

LAND OWNERSHIP:
The only known wild population occurred on private land.

PRELISTING:
The Service is working with the landowner through the private lands program to control weeds in the area where *Cyanea kuhihewa* occurs.

This species was originally included in the proposed rulemaking for Kauai II plant species submitted to the Regional Office, but was removed from the proposed rule published in 60 FR 49359 on October 2, 1995, because the species had not yet been described and published at that time.

DESCRIPTION OF MONITORING:
The information in this form is based on the results of two meetings of 20 botanical experts held by the Center for Plant Conservation in December 1995 and November 1996, who are cited where appropriate in the text.

We have incorporated updated and new information on this species from our files and the most recent supplement to the *Manual of the Flowering Plants of Hawaii* (Wagner and Herbst 2003). In addition, in 2004 the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art Medeiros, USGS Biological Resources Discipline; Hank Oppenheimer, resource manager for Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, National Tropical Botanical Garden. New information was provided by Steve Perlman and Ken Wood

On May 11, 2004, we received a petition dated May 4 from the Center for Biological Diversity (CBD) to list all Hawaiian candidates. This petition was thoroughly reviewed but did not provide any new information on this species (CBD 2004).

REFERENCES:

Almeda, F. 1990. Melastomataceae: in Wagner, W.L., D.R. Herbst, and S.H. Sohmer, Manual of the Flowering Plants of Hawai`i. University of Hawaii Press and Bishop Museum Press, Honolulu. Bishop Mus. Spec. Publ. 83:903-917.

Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May 4, 2004.

Cuddihy, L.W., and C.P. Stone. 1990. Alteration of native Hawaiian vegetation; effects of humans, their activities and introductions. Coop. Natl. Park Resources Stud. Unit, Hawaii. 138 pp.

Hawaii Department of Agriculture. 1981. Title 4, Subtitle 6, Chapter 68, Noxious weed rules. State of Hawaii, Honolulu. Administrative rules, 12 pp.

Hawaii, Department of Land and Natural Resources. N.d.-a. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Oahu. Division of Forestry and Wildlife, Honolulu. 2 pp.

Hawaii, Department of Land and Natural Resources. N.d.-b. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Molokai. Division of Forestry and Wildlife, Honolulu. 2 pp.

Hawaii, Department of Land and Natural Resources. N.d.-c. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Maui. Division of Forestry and Wildlife, Honolulu. 2 pp.

Lammers, T.G. 1996. A new linear-leaved Cyanea (Campanulaceae: Lobelioideae) from Kaua`i, and the "rediscovery" of Cyanea linearifolia. Brittonia 48(2):237-240.

Medeiros, A.C., Jr., L.L. Loope, and R.A. Holt. 1986. Status of native flowering plant species on the south slope of Haleakala, East Maui, Hawaii. Coop. Natl. Park Resources Stud. Unit, Hawaii, Techn. Rept. 59:1-230.

Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest bird communities of the Hawaiian Islands: Their dynamics, ecology, and conservation. Studies in Avian Biology 9:1-429. Cooper Ornithological Society, Los Angeles.

Smith, C.W. 1985. Impact of alien plants on Hawai`i's native biota: in Stone, C.P., and J.M.

Scott (eds.), Hawai`i's Terrestrial Ecosystems: Preservation and Management. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 180-250.

Tomich, P.Q. 1986. Mammals in Hawai`i: A synopsis and notational bibliography. Bishop Museum Press, Honolulu. 375 pp.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999. Manual of the Flowering Plants of Hawai`i, Bishop Mus. Spec. Publ. 97:1-1918. University of Hawaii Press and Bishop Museum Press, Honolulu.

Wagner, W.L. and D.R. Herbst. 2003. Electronic supplement to the manual of flowering plants of Hawai‘i, version 3.1. December 12, 2003. Available from the Internet. URL: http://rathbun.si.edu/botany/pacificislandbiodiversity/hawaiianflora/supplement.htm.

Wenkam, R. 1969. Kauai and the Park Country of Hawaii. Sierra Club, San Francisco. 160 pp.

Wood, K. 1994. National Tropical Botanical Garden—Provenance Report, *Cyanea kuhihewa* in ed.

LISTING PRIORITY:

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	**Imminent**	Monotypic genus	1
		Species	**2***
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Rationale for listing priority number:

Magnitude:
This species is highly threatened by pigs that degrade and destroy habitat, by rats and slugs that that directly prey upon it, and by non-native plants that outcompete and displace it. Threats to the lowland wet forest habitat of *Cyanea kuhihewa* occur throughout its range, and are expected to continue or increase without their control or eradication.

Imminence:
Threats to *Cyanea kuhihewa* from pigs, rats, slugs, and non-native plants are considered imminent because they are ongoing.

Is Emergency Listing Warranted?
No. *Cyanea kuhihewa* is no longer known in the wild, but additional populations may be found with further surveys. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. In addition, the Service is working with a landowner through the private lands program to control weeds in the area where *C. kuhihewa* occured and eventually reintroduce the species into managed areas. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of *C. kuhihewa* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use

of emergency listing procedures.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: David B. Allen
7/19/04
Regional Director, Fish and Wildlife Service
Date

Concur: Matt Hogan, Acting 5/2/05
Director, Fish and Wildlife Service Date

Do not concur: _____ _____
Director, Fish and Wildlife Service Date

Director's Remarks: _____

_____

_____

Date of annual review:_____
Conducted by:_____

Comments: _____

_____

_____

(rev. 4/22/04)