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

SCIENTIFIC NAME: *Stenogyne kealiae*

COMMON NAME: No common name

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, Lamiaceae (Mint 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, 503-231-6131

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

BIOLOGICAL INFORMATION:

Species Description *Stenogyne kealiae* is a trailing or scandent vine with stiff stems. Stems are weakly four-angled and glabrous. Leaves are thinly leathery, broadly lanceolate, glabrous, and have weakly revolute margins. Flowers are arranged three to five per verticillaster and are glandular pubescent within. The base of the straight corolla tube is white while the tubes and lobes are a deep pinkish purple. Nutlets are very dark purple at maturity and are approximately 7 to 8 millimeters (0.2 to 0.3 inches) long (Wagner and Weller 1991).

Taxonomy *Stenogyne kealiae* was combined into *Stenogyne purpurea* by Weller and Sakai in the 1990 Manual of the Flowering Plants of Hawaii (Weller and Sakai 1999). Since that publication, additional collections provided information to indicate that this species should not have been combined, and Wagner and Weller have resurrected the species (Wagner and Weller 1991; Wagner and Herbst 2003).

Habitat Typical habitat is wet forest at elevations between 1,091 and 1,250 meters (m) (3,580 and 4,100 feet (ft)) (Wagner and Weller 1991).

Historical and Current Range/Current Status This species is known from five populations totaling 100-200 individuals. This species is found in the northwestern section of the island of Kauai (Ken Wood, National Tropical Botanical Garden, pers. comm. 1995; Steve Weller, University of California, Irvine, pers. comm. 1995; Steve Perlman, National Tropical Botanical Garden, pers. comm. 1996). We do not know of any recent surveys or long-term trends for this species, but it is reasonable to assume the populations have continued to decline, since all of the threats are not managed throughout its range.

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range. This species is highly and imminently threatened by feral ungulates (K. Wood, pers. comm. 1995; S. Perlman, pers. comm. 1997). The goat (*Capra hircus*), a species originally native to the Middle East and India, was successfully introduced to the Hawaiian Islands in 1792. Currently populations exist on Kauai, Oahu, Maui, and Hawaii. On Kauai, feral goats have been present in drier, more rugged areas since the 1820s and they still occur in Waimea Canyon and along the Na Pali Coast, as well as in the drier perimeter of Alakai Swamp and even in its wetter areas during periods with low rainfall. Goats browse on introduced grasses and native plants, especially in drier and more open ecosystems. Feral goats eat native vegetation, trample roots and seedlings,

cause erosion, and promote the invasion of alien plants. They are able to forage in extremely rugged terrain and have a high reproductive capacity (Clarke and Cuddihy 1980; van Riper and van Riper 1982; Scott et al. 1986; Tomich 1986; Culliney 1988; Cuddihy and Stone 1990).

Although many plant species survive on steep cliffs inaccessible to goats, the original range of these plants was probably much larger. These species are now vulnerable to the long-term, indirect effects of goats, such as large-scale erosion (Corn et al. 1979). The dry and mesic habitats were damaged in the past by goats, and these effects are still apparent in the form of alien vegetation and erosion. This species is threatened by direct damage from feral goats, such as trampling of plants and seedlings and erosion of substrate (Clarke and Cuddihy 1980; van Riper and van Riper 1982; Scott et al. 1986; Culliney 1988).

The pig (*Sus scrofa*) 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. 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 (Smith 1985; Stone 1985; Medeiros et al. 1986; Scott et al. 1986; Tomich 1986; Cuddihy and Stone 1990; Wagner et al. 1999).

Mule deer (*Odocoileus hemionus*), native from western North America to central Mexico, were brought to Kauai from Oregon in the 1960s for game hunting and have not been introduced to any other Hawaiian island. Mule deer were introduced, in part, to provide another animal for hunting, since the State had planned to reduce the number of goats on Kauai because they were so destructive to the landscape (Kramer 1971). About 400 animals are known in and near Waimea Canyon, with some invasion into the Alakai Swamp in drier periods. Mule deer, legally hunted during only 1 month each year, trample native vegetation and cause erosion by creating trails and removing vegetation (DLNR 1985; Tomich 1986; Cuddihy and Stone 1990).

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

C. Disease or predation.
Predation of Hawaii's native vegetation by goats, pigs, and deer and the extensive damage caused by them have been well documented (van Riper and van Riper 1982; Tomich 1986). Although there is no evidence of predation on *Stenogyne kealiae*, these plants are not known to be unpalatable. Direct predation by ungulates is a possible threat to this species.

D. The inadequacy of existing regulatory mechanisms.
Goats, pigs, and mule deer are managed in Hawaii as game animals, but many populate

inaccessible areas where hunting is difficult, if not impossible, and therefore has little effect on their numbers (Hawaii Heritage Program 1990c). Goat and pig hunting is allowed year-round or during certain months, with deer hunting during certain months, depending on the area (Hawaii Department of Land and Natural Resources (DLNR) n.d.-a, n.d.-b, n.d.-c, 1990).

E. Other natural or manmade factors affecting its continued existence.
This species is threatened by several alien plant species, the major species being *Rubus argutus* (prickly Florida blackberry) and *Erigeron karvinskianus* (daisy fleabane) (S. Perlman, pers. comm. 1997). 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 planted 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 (Wenkam 1969; Scott *et al*. 1986; Cuddihy and Stone 1990).

Rubus argutus (prickly Florida blackberry), an aggressive alien species in disturbed mesic to wet forests and subalpine grasslands on Kauai and three other islands, is considered a noxious weed by the State of Hawaii (Hawaii Department of Agriculture 1981; Smith 1985; Wagner et al. 1999). Brought to Hawaii as a cultivated herbaceous plant, *Erigeron karvinskianus* (daisy fleabane) is naturalized in wetter areas of four islands (Wagner *et al*. 1999). Both of these introduced species have increased dramatically on Kauai since Hurricane Iniki in 1992 (Marie Bruegmann, U.S. Fish and Wildlife Service, pers. comm. 1996).

While we do not have direct documentation of decline in this species due to presence of alien pest plants, numerous studies have shown that numerous alien pest plants can outcompete almost any native species that has been studied in both Hawaii and other tropical islands. In addition, they often radically alter the habitat to a point that it is no longer suitable for the native species (Meyer and Florence 1996, Medeiros and Loope 1997, Medeiros *et al*. 1992, Smith 1985, Loope and Medeiros 1992, Smather and Gardner 1978, Ellshoff *et al*. 1995, Loope *et al*. in press).

Additionally, with only five populations totaling 100-200 individuals, reduced reproductive vigor and extinction due to naturally occurring events, such as hurricanes and landslides, are also threats common to the area where this species occurs (K. Wood, pers. comm. 1995; S. Perlman, pers. comm. 1997). Species like *Stenogyne kealiae* that are endemic to single small islands are inherently more vulnerable to extinction than widespread species because of the higher risks posed to a few populations and individuals by random demographic fluctuations and localized catastrophes such as hurricanes and disease outbreaks. When considered on their own, the natural processes associated with being a single island endemic and the habitat perturbation caused by hurricanes do not affect *Stenogyne* to such a degree that it is threatened or endangered with extinction in the foreseeable future, but these natural processes can exacerbate the threat

from anthropogenic factors, such as habitat loss for human development or predation by alien species.

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:
All populations occur on State land.

PRELISTING:
None.

DESCRIPTION OF MONITORING:
Much of the information in this form is based on the results of a meeting of 20 botanical experts held by the Center for Plant Conservation in December of 1995, and has been updated by personal communication with Steve Perlman of the National Tropical Botanical Garden and Steven Weller, expert in the genus from the University of California at Irvine.

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. No new information on status or range was provided.

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

REFERENCES :

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.

Clarke, G., and L.W. Cuddihy. 1980. A botanical reconnaissance of the Na Pali coast trail: Kee Beach to Kalalau Valley (April 9-11, 1980). Division of Forestry and Wildlife, Department of Land and Natural Resources, Hilo, Hawaii.

Corn, C.A., G. Clarke, L. Cuddihy, and L. Yoshida. 1979. A botanical reconnaissance of Kalalau, Honopu, Awaawapuhi, Nualolo and Milolii Valleys and shorelines--Na Pali, Kauai. Unpublished report. Division of Forestry and Wildlife, Department of Land and Natural Resources, Endangered Species Program, Honolulu. 14 pp.

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.

Culliney, J.L. 1988. Islands in a far sea; nature and man in Hawaii. Sierra Club Books, San Francisco. 410 pp.

Ellshoff, Z.E., D.E. Gardner, C. Wikler, and C.W. Smith. 1995. Annotated bibliography of the genus *Psidium*, with emphasis on *P. cattleianum* (strawberry guava) and *P. guajava* (common guava), forest weeds in Hawai`i. Cooperative National Park Resources Studies Unit, University of Hawaii. Technical Report 95.

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.

Hawaii, Department of Land and Natural Resources. 1985. Hunting in Hawaii, fourth revision. Division of Forestry and Wildlife, Honolulu, 32 pp.

Hawaii Heritage Program, The Nature Conservancy of Hawaii. 1990c. Management recommendations for Na Pali Coast State Park, island of Kauai. Unpublished report prepared for Hawaii, Department of Land and Natural Resources, Division of State Parks, Honolulu. 18 pp.

Kramer, R.J. 1971. Hawaiian land mammals. Charles E. Tuttle, Rutland, VT, 347 pp.

Loope, L.L. and A.C. Medeiros. 1992. A new and invasive grass on Maui. Newsletter of the Hawaiian Botanical Society 31: 7-8.

Loope, L., F. Starr and K. Starr. 2004 in press. Protecting endangered Hawaiian plant species from displacement by invasive plants on Maui, Hawaii. Invasive Weed Technology.

Medeiros, A.C., L.L. Loope, P. Conant & S. McElvaney. 1997. Status, ecology, and management of the invasive plant, *Miconia calvescens* DC (Melastomataceae) in the Hawaiian Islands. Bishop Mus. Occas. Pap.48: 23-36.

Medeiros, A.C., L.L. Loope, T. Flynn, S.J. Anderson, L.W. Cuddihy, and K.A. Wilson. 1992. Notes on the status of an invasive Australian tree fern (*Cyathea cooperi*) in Hawaiian rain forests. American Fern Journal 82: 27-33.

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.

Smather, G.A. and D.E. Gardner. 1978. Stand analysis of an invading firetree (*Myrica faya*

Aiton) population, Hawai`i. Proceeding of the Second Conference on Natural Science, Hawaii Volcanoes National Park, pp. 274-288.

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.

Stone, C.P. 1985. Alien animals in Hawai`i's native ecosystems: toward controlling the adverse effects of introduced vertebrates: 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. 251-297.

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

van Riper, S.G., and C. van Riper III. 1982. A field guide to the mammals in Hawaii. The Oriental Publishing Company, Honolulu. 68 pp.

Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1990. Manual of the flowering plants of Hawaii. Univ. of Hawaii Press and Bishop Museum Press; Honolulu. Bishop Mus. Spec. Pub. 83:1-1853.

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.

Wagner, W.L. and S.G. Weller. 1991. Resurrection of a Kaua`i Stenogyne: S. kealiae. Pacific Science 45(1):50-54.

Weller, S.G. and A.K. Sakai. 1999. Stenogyne: in Wagner, W.L., D.R. Herbst, and S.H. Sohmer, Manual of the flowering plants of Hawaii. Univ. of Hawaii Press and Bishop Museum Press; Honolulu. Bishop Mus. Spec. Pub. 83:831-843.

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

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 feral pigs, goats and deer that directly prey upon it and degrade and destroy habitat, and nonnative plants that complete for light and nutrients. Threats to the diverse mesic to wet forest habitat of *Stenogyne kealiae* occur throughout its range and are expected to continue or increase without control or eradication. The low numbers of individuals and limited range also increase the risk of extinction risk to this species from the existing threats.

Imminence:
Threats to *Stenogyne kealiae* from feral pigs, goats, deer, and nonnative plants are imminent because they are ongoing.

Is Emergency Listing Warranted?
No. 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. 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 *Stenogyne kealiae* 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: June 2004
Conducted by: _____

Comments: _____

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(rev. 4/22/04)