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: July 2005

STATUS/ACTION

___ 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: May 11, 2005

_N_ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? _yes

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

c. If the answer to a. and b. is "yes", 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. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. 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 past 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).

___ Listing priority change

Former LP: ___

New LP: ___

Date when the species first became a Candidate (as currently defined): 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.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ 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 does 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

LAND OWNERSHIP: All populations occur on State lands.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Christa Russell, 808-792-9400, christa_russell@fws.gov

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 synonymized with *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 have provided information indicating that *S. kealiae* is a valid taxon, and Wagner and Weller have resurrected the species (Wagner and Weller 1991; Wagner and Herbst 2003). This species is recognized as a distinct taxon in Wagner and Herbst (2003), the most recently accepted Hawaiian plant taxonomy.

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

Historical and Current Range/Current Status This species is known from five populations totaling 100 to 200 individuals and is found in the northwestern section of the island of Kauai (Steve Weller, University of California, Irvine, pers. comm. 1995; Ken Wood, National Tropical Botanical Garden, pers. comm. 1995; Steve Perlman, National Tropical Botanical Garden, pers. comm. 1996).

THREATS:
A. The present or threatened destruction, modification, or curtailment of its habitat or range.
This species is highly and imminently threatened by non-native feral goats, pigs, and mule deer introduced by 18th century early European explorers (K. Wood, pers. comm. 1995; S. Perlman, pers. comm. 1997)

On Kauai, feral goats (*Capra hircus*), 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 native plants, 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) Connect this statement to specific threats to *Stenogyne kealiae* Any observations of browsing or trampling on this species or its habitat? No known conservation measures have been taken to date to address this threat.

Feral pigs (*Sus scrofa)* are currently present on Kauai, where they 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*. 1999a). Connect this statement to specific threats to this species. No known conservation measures have been taken to date to address this threat.

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 trample native vegetation and cause erosion by creating trails and removing vegetation (Hawaii Department of Land and Natural Resources 1985; Tomich 1986; Cuddihy and Stone 1990). How do we know they are a threat to this species? No known conservation measures have been taken to date to address this threat.

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

C. Disease or predation.
Because Hawaii's native plants evolved without any browsing or grazing mammals present,

many lost natural defenses to such impacts (Carlquist 1980, Lamoureux 1994). Browsing by ungulates has been observed on many other native species, including common and rare or endangered species (Cuddihy and Stone 1990; Loope *et al*. 1991). Therefore, even though we have no evidence of browsing for this species, it is likely that feral goats and pigs, and mule deer impact this species directly as well as their indirect impacts to the surrounding habitat.

D. The inadequacy of existing regulatory mechanisms.
Goats and pigs are managed in Hawaii as game animals, but many herds populate inaccessible areas where hunting is difficult, if not impossible, and therefore has little effect on their numbers (Hawaii Heritage Program 1990). Goat and pig hunting is allowed year-round or during certain months, depending on the area. Mule deer were released on Kauai in the 1906's as a game animal. They are legally hunted during only 1 month each year (Hawaii Department of Land and Natural Resources n.d.-a, n.d.-b, n.d.-c, n.d.-d). However, public hunting does not adequately control the number of goats, pigs, or mule deer to eliminate these threats to *Stenogyne kealiae*. No other known conservation measures have been taken to date to address these threats.

E. Other natural or manmade factors affecting its continued existence.
This species is threatened by several alien plant species, particularly *Rubus argutus* (prickly Florida blackberry) and *Erigeron karvinskianus* (daisy fleabane) (S. Perlman, pers. comm., 1997). With only five populations totaling 100 to 200 individuals, reduced reproductive vigor and extinction due to stochastic 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).). The original native vascular flora of Hawaii consisted of about 1,400 species, nearly 90 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 taxa, 47 percent were introduced from other parts of the world, and nearly 100 species have become pests (Smith 1985; Wagner *et al.* 1999a). Several studies (Cuddihy and Stone 1990; Wood and Perlman 1997; Robichaux et al. 1998) indicate nonnative plant species may outcompete native plants similar to *Schiedea pubescens.* Competition may be for space, light, water or nutrients, or there may be a chemical inhibition of other plants (Smith 1985; Cuddihy and Stone 1990). In addition, nonnative pest plants found in habitat similar to that of this species have been shown to make the habitat less suitable for native species (Smathers and Gardner 1978; Smith 1985; Medeiros *et al*. 1992; Loope and Medeiros 1992; Ellshoff *et al*. 1995; Meyer and Florence 1996; Medeiros *et al.* 1997; Loope *et al*. 2004). In particular, alien pest plant species modify habitat by modifying availability of light, altering soil-water regimes, modifying nutrient cycling, or altering fire characteristics of native plant communities (Smith 1985; Cuddihy and Stone 1990; Vitousek *et al*. 1987). Because of demonstrated habitat modification and resource competition by nonnative plant species in habitat similar to that of *Schiedea pubescens,* the Service believes nonnative plant species are a threat to this species.

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*. 1999a). Brought to Hawaii as a cultivated herbaceous plant, *Erigeron karvinskianus* (daisy fleabane) is naturalized in wetter areas of four islands (Wagner *et al*. 1999a). Both of these introduced species have increased dramatically since Hurricane Iniki in 1992 (Marie Bruegmann,

U.S. Fish and Wildlife Service, pers. comm. 1996). No known conservation measures have been taken to date to address the threat of nonnative plants to this species.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED
None known.

SUMMARY OF THREATS:
The major threats to this species include feral pigs, goats, and deer that degrade and destroy habitat and may directly prey upon it, and by nonnative plants that complete for light and nutrients, which are believed to be a major cause of the decline of this species throughout its range. No conservation efforts have been initiated to date.

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

Rationale for listing priority number:
Magnitude:
This species is highly threatened by feral pigs and goats, and deer that degrade and destroy habitat and may directly prey upon it, and by nonnative plants that complete for light and nutrients. These threats to the diverse mesic to wet forest habitat of *Stenogyne kealiae* and individuals of this species occur throughout its range and are expected to continue or increase without their control or eradication. No known conservation measures have been taken to date to address these threats.

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

Yes Have you promptly reviewed all of the information received regarding the species for the

purpose of determining whether emergency listing is needed?

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.

DESCRIPTION OF MONITORING:
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 was updated by personal communication with Steve Perlman of the National Tropical Botanical Garden and Steven Weller, Department of Ecology and Evolutionary Biology, University of California, Irvine. We have incorporated additional 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 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, U.S.G.S. 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 was provided in 2004. In 2005 we contacted the species experts listed below, but received no new information on this taxon.

The Hawaii Natural Heritage Program identified this species as critically imperiled (Hawaii Natural Heritage Program Database 2004). Based on the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this species is recognized as Rare (could be considered at risk) by Wagner *et al*. 1999b.

Species experts were contacted but did not provide new information this year, no new literature was found, and no known entities are studying this species. However, it is highly likely that the previously reported threats continue to impact the species at the same or an increased level.

COORDINATION WITH STATES:
In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for this species and provided no additional information or corrections (V. Caraway, pers. comm. 2005).

LITERATURE CITED
List all experts contacted:

Name	Date	Place of Employment
1. Joel Lau	June 28, 2005	Hawaii Natural Heritage Program
2. Art Medeiros	June 28, 2005	U.S.G.S. Biological Resources Discipline

3. Jim Jacobi	June 28, 2005	U.S.G.S. Biological Resources Discipline
4. Rick Warshauer	June 28, 2005	U.S.G.S. Biological Resources Discipline
5. Hank Oppenheimer	June 28, 2005	Maui Land and Pineapple Company
6. Kapua Kawelo	June 28, 2005	U.S. Army
7. Dave Lorence	June 28, 2005	National Tropical Botanical Garden
8. Steve Perlman	June 28, 2005	National Tropical Botanical Garden
9. Ken Wood	June 28, 2005	National Tropical Botanical Garden
10. Marie Bruegmann	July 13, 2005	U.S. Fish and Wildlife Service
11. Vickie Caraway	June 14, 2005	Hawaii Division of Forestry and Wildlife

List all databases searched:

Name	Date
1. Hawaii Natural Heritage Program	2004

Other resources utilized:

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.

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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. N.d.-d. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Kauai. Division of Forestry and Wildlife,

Honolulu.
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. Management and research for protecting endangered Hawaiian plant species from displacement by invasive plants on Maui, Hawaii. Weed Technology 18: 1472-1474.
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.
Medeiros, A.C., L.L. Loope, P. Conant and 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.
Meyer, J.-Y. and J. Florence. 1996. Tahiti's native flora endangered by the invasion of *Miconia calvescens* D.C. (Melastomataceae). Journal of Biogeography 23: 775-781.
Robichaux, R., J. Canfield, F. R. Warshauer, L. Perry, M. Bruegmann, and G. Carr. 1998. Adaptive Radiation. Endangered Species Bulletin. November/December.
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Smathers, 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.
Vitousek, P.M., C.M. D'Antonio, L.L. Loope, M. Rejnanek, and R. Westerbrooks. 1997. Introduced species: a significant component of human-caused global change. New

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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.
Wood, K.R. and S. Perlman. 1997. Maui 14 plant survey final report. Submitted by National Tropical Botanical Garden, October, 1997.

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: Acting _____ 11/16/05
Regional Director, Fish and Wildlife Service Date

Concur: _____ August 23, 2006
Director, Fish and Wildlife Service Date

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

Date of annual review: September 16, 2005
Conducted by: Marie M. Bruegmann, Pacific Islands FWO
Plant Recovery Coordinator

Comments:
PIFWO Review

Reviewed by: Christa Russell Date: September 19, 2005
Plant Conservation Program Leader

Gina Shultz Date: October 14, 2005
Assistant Field Supervisor,
Endangered Species

Patrick Leonard Date: October 14, 2005
Field Supervisor